2011-1312
(Serial No. 09/515,978)

In The
United States Court of Appeals
For The Federal Circuit

IN RE GERALD M. BENSON and KENNETH L. SMITH

APPEAL FROM THE UNITED STATES PATENT AND TRADEMARK OFFICE, BOARD OF PATENT APPEALS AND INTERFERENCES.

BRIEF OF APPELLANT

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Dated: June 27, 2011

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UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

In re. Gerald M. Benson and Kenneth L. Smith v. _____

No. 2011-1312

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1. The full name of every party or amicus represented by me is:

Gerald M. Benson and Kenneth L. Smith

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None

May 9, 2011
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Sandra K. Nowak
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Sandra K. Nowak
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STATEMENT OF RELATED CASES

Case 2011-1311 (Serial No. 11/061,326) is a related case that is currently pending before this Court. Case 2011-1311 is an appeal of the same issues that are present in this case. Serial No. 11/061,326 is a related patent application. Consolidation of these two cases is likely.

JURISDICTIONAL STATEMENT

On December 29, 2010, the Board of Patent Appeals and Interferences affirmed the Patent Examiner's decision rejecting all pending claims in Patent Application No. 09/515,978 to Benson and Smith as lacking novelty under 35 U.S.C. § 102(b) over U.S. Patent No. 5,657,162 to Nilsen. This Court has jurisdiction over applicant Benson and Smith's appeal under 28 U.S.C. § 1295(a)(4)(A).

STATEMENT OF THE ISSUES

1. Did the Board err in construing the term "embedded" in the appealed claims by refusing to give the term its ordinary, accustomed meaning, where:

(a) there is no evidence in the specification that the applicants intended anything other than the ordinary meaning as reflected in the dictionary definition ("fixed firmly in a surrounding mass"); and

(b) in relying on its flawed reading of the specification, the Board improperly adopted an anomalous definition of "embedded" in light of specification language in contravention of established precedents of this Court and in contradiction to separate claim language?

2. Did the Board err in finding that the appealed claims were anticipated by Nilsen, where,

(a) Nilsen does not disclose each and every claim element of the appealed claims, including

(1) machined substrate pieces *fixed firmly in a surrounding mass* of a replicated substrate;

(2) machined substrate pieces fixed firmly *by* a surrounding mass of a replicated substrate;

(3) machined substrate pieces embedded *in* portions of the structured surface; and consequently;

(b) the Board's finding of anticipation is not supported by substantial evidence?

STATEMENT OF THE CASE

Almost six years ago, this Court decided *Phillips v. AWH Corporation* in which it ruled that in the absence of clear intent by the applicant/patentee, patent claims should not be confined to specific embodiments of a patent specification. 415 F.3d 1303, 1311 (Fed. Cir. 2005) (*en banc*). Despite this Court's clear direction, the Board of Patent Appeals and Interferences ("Board") continues to improperly confine patent claims to specific embodiments. In the present case, the Board not only improperly confined the patent claims to a specific embodiment, it

based its improper construction on clear factual errors. Applicants respectfully request that this Court reject the Board's improperly restrictive definition of the term "embedded" and instead adopt the ordinary dictionary meaning of the term.

This appeal involves construction of the term "embedded" in patent claims on appeal from a Decision of the Board. The appealed claims relate to compound substrate materials fabricated using microreplication techniques. The compound substrate materials can be used, for example, in structured surfaces containing retroreflective cube corner elements. The appealed claims relate to pieces of a machined substrate *embedded* in the structured surface of a replicated substrate.

The Examiner finally rejected the appealed claims as anticipated by U.S. Patent 5,657,162 to Nilsen et al. ("Nilsen"). Nilsen discloses reflective metal deposits coated on the surface of microprism formations in retroreflective materials. The Examiner rejected Applicants' proposed construction of "embedded" – the plain and ordinary meaning, as reflected in the dictionary definition "fixed firmly in a surrounding mass" in favor of the definition "bonded." In deviating from the ordinary meaning of the term "embedded," the Examiner relied on portions of the specification which, according to the Examiner, disclosed that the claimed replicated and machined substrates are "only bonded" together to create an interface. Basing her decision on the construction of the term "embedded" to mean "only bonded," the Examiner found the currently appealed

claims to be anticipated by Nilsen's coated deposits bonded on the surface of microprism formations.

The Board affirmed, rejecting the ordinary meaning of the term "embedded" and concluding that the term means that pieces of machined substrate are "*attached to a surface* of replicated substrate and otherwise surrounded by replicated substrate." The Board relied on the same portions of the specification as the Examiner, agreed with the Examiner that Applicants' machined substrate pieces are "embedded" in the same sense that Nilsen's coating is bonded to the microprism substrate, and accordingly affirmed the finding of anticipation.

On appeal, Applicants contend that:

(a) the term "embedded" should be given its ordinary, accustomed dictionary meaning --"fixed firmly in a surrounding mass" – and there is nothing in the record to suggest that the Applicants intended any other meaning for the term;

(b) the Board's construction of the term "embedded" was in error for at least the following reasons: (1) it improperly confined the claims to a specific embodiment, in direct contradiction of controlling legal doctrine (2) the Board's justification was based on factually inaccurate conclusions and (3) the Board's construction was inconsistent with other claim elements; and

(c) Nilsen's disclosed surface coating does not anticipate Applicants' claims requiring machined pieces embedded in the structured surface of a replicated substrate.

We turn first to a discussion of the patent application and claims on appeal.

STATEMENT OF FACTS

A. The Applicants' Claims: Compound Substrates with Machined Substrate Pieces Embedded in a Replicated Substrate

The patent application on appeal [A52-100] was filed on February 25, 2000 in the names of inventors Benson and Smith, hereinafter referred to as "Applicants" or "Appellants." The application relates to a compound substrate, which is defined as "a substrate formed from a machined substrate having a structured surface and a replicated substrate . . . bonded along at least a portion of the interface with the machined substrate." [A77: 19-22.] The following describes one exemplary method of forming a compound substrate.

A blank is provided (for example blank 22 shown in Fig. 2) [A59: 5-29; A89] and is machined to form a machined substrate, examples of which are shown in Figs. 4 and 5. [A60:1 – A61: 20 & A88, 90.] The machined substrate is then passivated, for example by applying a release layer or modifying the structured surface of the machined substrate to permit separation of a subsequent replicated substrate. [A61:21 – A62:4.] A replicated substrate is then formed over the machined substrate (as is shown in Figs. 6 and 6a [A91, 92]) such that "[p]ortions

of the replicated substrate 70 protrude into the machined substrate 28 to form a compound substrate 82 (*see also* Fig. 9)." [A62:14-16; *see also* A62:5-20; A94.] The back surface of the machined substrate is then machined to form compound substrate 82, for example, as shown in Fig. 9 (*see, e.g.*, A62:21 – A63:5 and A63:26 – A64:8). Fig. 9 (A94; reproduced below) is a schematic illustration of the resulting compound substrate 82.

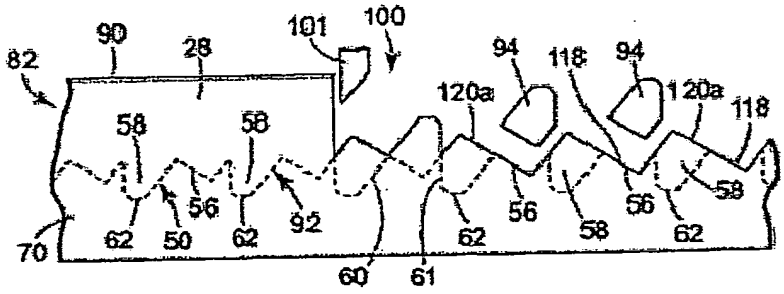


Fig. 9

As shown in Fig. 9, compound substrate 82 includes the machined substrate 28 and the un-separated replicated substrate 70. The interface 92 between the structured surface 50 [of machined substrate 28] and the replicated substrate 70 is indicated by a dashed line. [A63:19-22.] After the machining step is complete, "waste portions 94 of the machined substrate 28 fall away or are removed, leaving a cube corner cavity 118 in the replicated substrate 70." [A64: 9-11.]

The specification goes on to explain how machined substrate pieces remain embedded:

The protrusions 58 on the machined substrate 28 remain embedded in the replicated substrate 70. Once all of the waste portions 94 of the machined substrate 28 are removed from the replicated substrate 70, the cube corner pyramids 120a [from the machined substrate 28] and cube corner cavities 118 [from the replicated substrate 70] form a geometric structured surface 100 with an array of PG cube corner elements.

[A64:13-20] (emphasis added).

Fig. 10 (reproduced below) is a view of the resulting structured surface 100 of compound substrate 82 after all side surfaces have been formed and all waste portions 94 have been removed. [A95.]

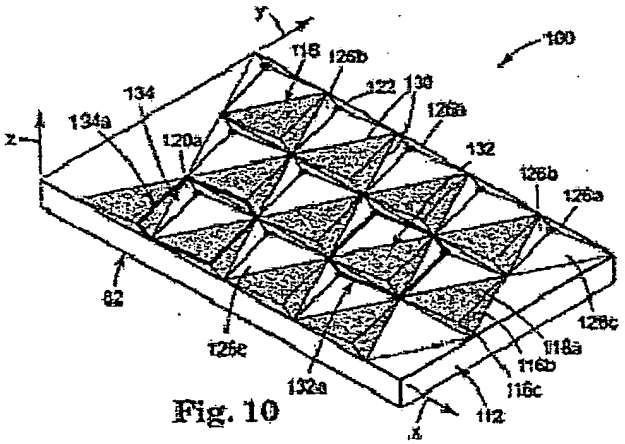


Fig. 10

The structured surface shown in Figure 10 has cube corner cavities 118 (each of which has three replicated faces 116a, 116b, 116c) and cube corner pyramids 120a (each of which has three machined faces 126a, 126b, 126c). [A64: 22-25.] The specification then explains the finished structure of the claimed compound substrate, and how the faces of the cube corner pyramids 120a and the cube corner cavities 118 are oriented and aligned to create pyramids 134 and

cavities 132 having aligned compound faces of replicated substrate and machined substrate:

> Each of the three faces 126a-c of the cube corner pyramids 120a are machined to be substantially aligned with the nearest face 116 of an adjacent cube corner cavity 118. Consequently, each new cube corner cavity 132 compris[es] one replicated cube corner cavity 118 and one machined face 126 from each of its neighboring geometric structures 120a. Reference numeral 132a shows in bold outline one such cube corner cavity 132. A given face of one of the cube corner cavities 132 comprises one face of a cube corner cavity 118 formed in the replicated substrate 70 and one of the faces 126a, 126b, or 126c machined in the machined substrate 28. . . . [F]aces 116 of the cube corner cavity 118 are machined in the replicated substrate 70. Therefore, each cube corner cavity 132 comprises a compound face made up of a portion substantially formed or replicated in the replicated substrate 70 and a portion machined in the machined substrate 28 separated by a transition line 130. The transition lines 130 lie along the boundary or interface between the machined substrate 28 and the replicated substrate 70.

[A65: 3-16.]

In Figure 10, the pyramids 120a (also shown in Figure 9) show visible machined faces 126a-c and the cavities 118 include visible replicated faces 116a-c. As shown in Figure 9, beneath the replicated faces that form the cavity 118, portions of the replicated substrate surround portions of the machined substrate beneath the visible pyramid structure.

Figures 9 and 10 of the application and the accompanying description show the key features of the claimed compound substrates relevant to this appeal. The machined substrate protrusions (shown by reference numeral 58) remain embedded in the replicated substrate, *i.e.* the protrusions are surrounded by the mass of the

replicated substrate and fixed in that surrounding mass. There is an interface between the machined substrate protrusions and the replicated substrate, but in three dimensions the mass of replicated substrate surrounds three sides of the machined substrate pieces, thereby constraining its movement. The machined pieces are thus more than merely "bonded" to or "attached to the surface" of the replicated substrate. They are fixed in a mass that surrounds them.

B. The Claims on Appeal

Claims 16-23 and 40 are on appeal. Before the Board, Applicants argued all claims on appeal as a group [A3], and the Board decided the appeal based on claim 16, which reads as follows (with emphasis added to the language at issue in this appeal):

> 16. A compound substrate, comprising:
>
> a replicated substrate having a structured surface;
>
> *a plurality of machined substrate pieces embedded in portions of the structured surface*; and
>
> a plurality of cube corner elements that each form a cube corner pyramid having *a machined substrate piece embedded in a portion of the structured surface* and that each have at least one compound face including a replicated substrate face and a machined substrate face.

[A1274-75.]

The two additional independent claims on appeal (20 and 40) contain similar language specifying that pieces of machined substrate are embedded in the

structured surface of a replicated substrate (*e.g.*, claim 20 – "plurality of discrete pieces of the machined substrate embedded in the structured surface"; and claim 40 – "machined substrate portion embedded in the replicated substrate portion"). [A1275, 1278.]

C. The Nilsen Reference

Nilsen [A29-36] relates to "retroreflective sheeting and articles in which the size of the retroreflective and non-retroreflective surfaces may be varied across an array of microprisms. . . by varying the locations of the reflective coating applied to the microprism side facets, such that, some prism side facets are completely coated with reflective material while others are coated only at the apex area; and still others are coated with a non-reflective coatings [sic], such as, a colored adhesive." [A29.]

As an example of Nilsen's disclosure, Figure 2 (reproduced below) shows metallic deposits 30A and 30B applied on portions of micropyramid structures 26.

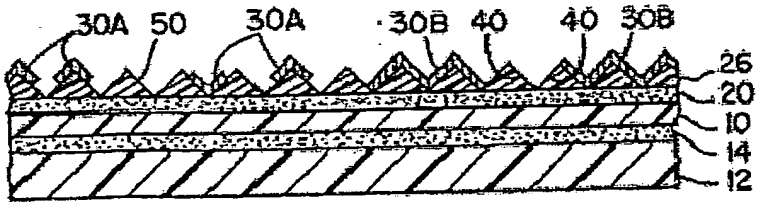


FIG. 2

[A30.]

Nilsen discloses forming "transparent reflective metallic deposits *on the surface* of the microprism formations" [A33; 2:64-65 (emphasis added).] It does not disclose anything that is fixed firmly in the surrounding mass of the microprism formations, and thus does not disclose anything that would meet the ordinary and accustomed definition of "embedded" – "fixed firmly in a surrounding mass."

D. The Board's Decision

The Board affirmed the Examiner's rejection of the claims on appeal as anticipated by Nilsen, agreeing with the Examiner's interpretation of "embedded" in light of the pending specification. Specifically, the Board found that the specification did not support the plain, dictionary meaning of the term "embedded." The Board then created its own definition for the term "embedded" based on a single embodiment of the specification. Using this entirely novel definition of "embedded," the Board then found that the claims on appeal were anticipated by Nilsen.

To arrive at the conclusion that the pending specification did not support the ordinary meaning of the term "embedded," the Board took the dictionary definition and re-defined it to include an additional requirement. Specifically, the Board stated that although the dictionary definition is "to fix firmly in a surrounding mass" (*American Heritage Dictionary of the English Language* (Fourth Edition

2000) *See* A1271), "we determine that this definition of "embedded" means that the surrounding mass holds in place the object embedded" [A6.] Notably, the Board's re-definition of the dictionary definition added a requirement not present in the dictionary definition – that the object embedded be held in place *by* the surrounding mass. This requirement is clearly not part of the dictionary definition, nor is it a commonly understood component of the definition as understood by one of ordinary skill in the art.

The Board then concluded that the pending specification did not provide adequate support for the added requirement. Specifically, the Board stated that "there is no evidence in the disclosure in the specification that the [machined substrate] protrusions 58 remaining in substrate 70 are fixed firmly *by* the surrounding mass of replicated substrate 70 which would occur if the protrusions 58 are 'embedded' in replicated substrate 70 as specified in the dictionary definition." [A6-7 (emphasis added).] To support this finding, the Board focused on selected passages of the specification pertaining to bonding at the interface between the replicated and machined substrate. The Board found that the specification discloses that: (1) "the replicated substrate 70 adheres to the structured surface 50 along the top surface 62 of the protrusions 58, but not along the passivation surfaces of the pyramids 56 and the side surfaces 60,61 of the protrusions 58"; (2) "[b]onding at the interface 92, however, is limited to the

abraded top surface 62 of the protrusions 58"; and (3) [t]he distal ends or top surfaces of the discrete pieces or protrusions 58 from the machined substrate 28 are bonded to the replicated substrate 70." [A4-5; quoting A62:11-16; A63:19-25; A64:11-17.] Consequently, the Board held that the specification did not support their interpretation of the dictionary definition.

The Board concluded, after stating that "in this instance, it is clear from the disclosure in the Specification that the meaning of embedded is not limited to the dictionary definition" that the term "embedded" means attachment to a surface:

> Accordingly, we are of the opinion that the claim language "a plurality of machined substrate pieces embedded in portions of the structured surface [of the replicated substrate]" of representative claim 16, means that protrusions 58 of machined substrate are *attached to a surface* of replicated substrate 70 and otherwise surrounded to any extent by replicated substrate 70.

[A7 (emphasis added).]

The Board then affirmed the finding of anticipation, based on its construction of "embedded," quoting the Examiner's finding that Applicants' claimed

> "machined portions are firmly surface bonded to the replicated substrate surface and surround[ed] by replicated substrate protrusions . . . [w]hich is the same structure Nilsen shows, e.g. a coating substrate selectively bonded to the microprism substrate and the coating substrate by microprism substrate protrusions."

[A8 (quoting Examiner's Answer at A1311).]

SUMMARY OF THE ARGUMENT

The Board erred in its construction of "embedded." "Embedded" should be given its ordinary and accustomed meaning as reflected in its dictionary definition – "fixed firmly in a surrounding mass." There is no evidence to suggest that Applicants intended any other meaning. The usages and depictions of the term in the specification are consistent with, and support, the ordinary and accustomed meaning.

The Board erred in re-defining the dictionary definition to include an additional limitation – that the pieces be fixed *by* the surrounding mass. The Board's rejection of and departure from the ordinary dictionary meaning of "embedded," in the absence of any evidence that the inventor's intended a different meaning, is unreasonable and contrary to controlling decisions of this Court.

The Board erred in its assessment of the specification. Without acquiescing to the Board's improper re-definition of the dictionary definition, even if "embedded" were interpreted to require that the machined pieces be fixed firmly *by* the surrounding mass, the specification is consistent with, and supports such a definition.

The Board's reliance on the "adherence" and "bonding" language that describes certain embodiments of the claims was erroneous, unreasonable, and misplaced. The language of the specification makes clear that "embedded" is a

condition separate and distinct from descriptions of the "bonded" condition that the Board relied on for its construction. Moreover, the Board relied on selective descriptions of certain embodiments, wholly ignoring others. This is unreasonable. Additionally, the self-styled definition of "embedded" crafted by the Board contradicts or eliminates wholly separate elements of the pending claims. By narrowly construing "embedded" in light of a strained reading of selectively chosen specification language, the Board failed to give "embedded" its broadest possible construction in light of the specification, as is mandated by the controlling decisions of this Court.

With "embedded" properly construed, Nilsen does not anticipate the claims on appeal. Nilsen discloses metallic deposits surface coated on a micropyramid structure, and certainly does not disclose a machined substrate fixed firmly in a surrounding mass of replicated substrate. Thus, the Board's finding of anticipation is not supported by substantial evidence and should therefore be reversed.

Even were this Court to affirm the Board's improper constructions of "embedded," Nilsen does not anticipate the pending claims because (1) the coatings of Nilsen are not embedded *"in"* the replicated substrate and (2) the microprism formations of Nilsen are not a *surrounding mass*, as the pending claims require. Thus, the Board's finding of anticipation is not supported by substantial evidence and should therefore be reversed.

ARGUMENT

A. Legal Standards

This Court reviews the Board's legal conclusions *de novo*, and the Board's factual findings are upheld only if they are supported by substantial evidence. *In re Bass*, 314 F.3d 575, 576 (Fed. Cir. 2002). Anticipation is a question of fact reviewed for substantial evidence. *In re Baxter Travenol Labs.*, 952 F.2d 388, 390 (Fed. Cir. 1991). This Court reviews the Board's interpretation of disputed claim language to determine whether it is "reasonable." *In re Morris*, 127 F.3d 1048, 1055 (Fed. Cir. 1997). The Board must give claims their broadest reasonable construction that is consistent with the specification. *In re ICON Health & Fitness, Inc.*, 496 F.3d 1374, 1379 (Fed. Cir. 2007) (citing *In re Am. Acad. of Sci. Tech Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004)).

B. The Board Erred in Construing "Embedded" in the Appealed Claims to Mean Anything other than the Ordinary and Accustomed Meaning

In construing a patent claim, claim terms will be accorded their ordinary and accustomed meaning unless the specification or prosecution history indicates that the inventor intended otherwise. *Wolverine World Wide, Inc. v. Nike, Inc.*, 38 F.3d 1192, 1196 (Fed. Cir. 1995); *Transmatic, Inc. v. Gulton Industries, Inc.*, 53 F.3d 1270, 1277 (Fed. Cir. 1994); *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (*en banc*). While the specification and prosecution history can be highly relevant to the claim construction analysis, "[t]he claims

themselves . . . govern the meaning of claim terms." *SEB S.A. v. Montgomery Ward & Co., Inc.*, 594 F.3d 1360, 1368 (Fed. Cir. 2010). After all, it is the claims, not embodiments disclosed by the patentee, that define the scope of patent protection. *Phillips*, 415 F.3d at 1312.

The claims on appeal, using claim 16 as an example, require "machined substrate pieces *embedded* in portions of the structured surface" of a replicated substrate. The plain and ordinary meaning of the verb "to embed" is reflected in its dictionary definition: "[t]o fix firmly in a surrounding mass." *The American Heritage Dictionary of the English Language* (Fourth Edition 2000). [A1271]. Consequently, the adjectival form of embed – embedded – means "fixed firmly in a surrounding mass."

1. The Board Erred in Re-Defining the Definition of "Embedded"

The Board's re-definition of the dictionary definition of "embedded" to include an additional requirement – that the machined pieces be fixed firmly *by* the surrounding mass – was improper. The Board's rejection of and departure from the ordinary dictionary meaning of "embedded," in the absence of any evidence that the inventor's intended a different meaning, is unreasonable and contrary to controlling decisions of this Court. There is nothing in the specification to suggest that Applicants intended any meaning for "embedded" other than the ordinary meaning of "fixed firmly in a surrounding mass." *See Milken Composites, LLC v.*

Wilson Sporting Goods Co., 515 F.3d 1331, 1337-38 (Fed. Cir. 2008) (affirming claim construction of the term "insert" as consistent with the plain and ordinary meaning as reflected in the dictionary definition). "Without an express intent to impart a novel meaning to claim terms, an inventor's claim terms take on their ordinary meaning. *York Prods., Inc. v. Central Tractor Farm & Family Ctr.*, 99 F.3d 1568, 1572 (Fed. Cir. 1996). *See Epistar Corp. v. Int'l Trade Comm'n*, 566 F.3d 1321, 1334 (Fed. Cir. 2009) (referring to the "heavy presumption" that claim terms carry their ordinary meaning).

Notably, the Board never assessed whether the patent application specification supports the plain, dictionary definition "fixed firmly in a surrounding mass." Instead, the Board only assessed whether the specification supported the Board's faulty interpretation of the dictionary definition. All uses of the term "embedded" are *fully consistent with the actual dictionary definition*; indeed, the usages taken together confirm that the term should be given its ordinary meaning and that Applicants did not intend otherwise.

The term "embedded" is used three times in the specification:

(1) "The protrusions 58 on the machined substrate 28 remain embedded in the replicated substrate 70." [A64:16-17.]

(2) "The portions 278,280 of the machined substrate 200 remain embedded in the replicated substrate 214 portion of the compound substrate 236." [A70:26-28.]

(3) "The compound substrate 82 and reference pads 30 embedded in the assembly are shown in phantom for purposes of illustration only." [A62:25-26.]

The first and second usages of "embedded" are consistent with, and indeed refer explicitly to, the machined substrate pieces being fixed within the surrounding mass of the structured surface of the replicated substrate. With respect to the first usage, the machined substrate protrusions (reference numeral 58 in Fig. 9) remain embedded in the replicated substrate. Similarly, the second usage refers, with reference to Figure 22, to discrete pieces of machined substrate "embedded" in the replicated substrate. [A70:24-25.] Both Figures 9 and 22 very clearly show a *surrounding mass* of replicated substrate in which the pieces of machined substrate are fixed. [A94, 99.]

The third usage is also consistent with the ordinary meaning of "embedded." This usage refers to Figure 7 and the fact that reference pads (a feature distinct from the machined pieces elsewhere referred to as "embedded") "embedded" in the assembly cannot be seen in the orientation shown and are therefore depicted in phantom to illustrate the assembly. [A93.] Figure 4 shows the reference pads

(reference numerals 30a-30d) that correspond to the pads 30 in phantom in Figure 7. [A88.] This usage of "embedded" has nothing at all to do with pieces of machined substrate embedded in a replicated substrate or with the interface between those two substrates. Rather, it refers to the reference pads being fixed in the surrounding mass of the assembled substrate.

These usages of "embedded" in the specification clearly illustrate that the term is used in different and distinct contexts in the specification to generally refer to the concept of a feature (in one instance, the feature is a reference pad and in another instance, the feature is a machined substrate piece) being fixed in a surrounding mass (in one instance the mass is the assembly and in another instance, the mass is the replicated substrate), demonstrating convincingly that the term should be given the ordinary and accustomed dictionary meaning.

Finally, the specification includes a glossary of terms that provides definitions of some twenty-three terms, including key claim terms such as "compound face" and "cube corner element." [A77-79.] The term "embedded" is not included in this glossary, leaving no doubt that the Applicants intended "embedded" to be given its ordinary and accustomed meaning.

2. The Board Erred in Concluding that the Specification Did Not Support a Definition of "Embedded" Requiring Fixation By a Surrounding Mass

Without acquiescing to the Board's improper re-definition of the dictionary definition of "embedded", even if this Court were to determine that the definition includes a requirement that the substrate pieces be fixed firmly *by* the surrounding mass, the pending specification is consistent with and supports such a definition. In the present case, the surrounding mass is the replicated substrate 70. Machined substrate pieces 58 are fixed in this mass not only by bonding (which is merely one exemplary fixation method) but also by the three dimensional constraint of pieces 58, which are surrounded on three sides by surrounding mass 70. Surrounding mass 70 literally fixes pieces 58 firmly within itself by constraining their movement in three dimensions. It is important, in this regard, to extrapolate the two-dimensional depictions in Figure 9 [A94] to the three dimensional reality of the claimed compound substrates; in three dimensions, the replicated substrate surrounds, and thereby fixes within it, the pieces of machined substrate. Figures 5 and 10 [A90, 95] highlight the three-dimensional nature of the claimed structures. As these figures clearly illustrate, machined substrate protrusions (reference numeral 58 in Fig. 9) remain embedded in the replicated substrate 70, *i.e.* the protrusions are surrounded by the mass of the replicated substrate and are firmly fixed by the surrounding mass.

In summary, even if the ordinary and accustomed dictionary meaning of "embedded" was interpreted to include a requirement that the pieces be fixed *by* a surrounding mass, the specification is consistent with and supports this meaning.

C. The Board's Construction of "Embedded" is Unreasonable and Contrary to Controlling Law

Instead of giving "embedded" its ordinary, accustomed meaning, the Board concluded that the claim language "a plurality of machined substrate pieces embedded in portions of the structured surface means that protrusions 58 pieces of machined substrate are attached to a surface of replicated substrate 70 and otherwise surrounded to any extent by replicated substrate 70." [A7.] On its path to reaching this claim construction, the Board committed several legal and factual errors. As described above, the Board's most serious error was abandoning the ordinary, accustomed meaning of a claim term when there is no evidence the inventors intended that result and when the specification is consistent with and supports that definition. Additionally, the Board's self-fashioned definition of "embedded" was unreasonable and contrary to controlling law for a variety of reasons. Lastly, the Board's substitution of its own construction based on a selective and flawed reading of the specification violated black letter precedent of this Court.

1. The Board Ignored the Principle of Term Differentiation

The Board self-defined the term "embedded" to mean attached to or bonded. [A7.] In so doing, the Board ignored the fact that the specification makes clear that the concepts of "bonded" and "embedded" are distinct from one another. Specifically, the specification refers to the concept of "bonded" separately from "embedded" numerous times. This Court has made clear that when applicants choose to use two different terms, it is assumed that those terms were intended to mean two different things. *See Ethicon Endo-Surgery, Inc. v U.S. Surgical Corp.*, 93 F.3d 1572, 1579-80 (Fed. Cir. 1996) (construing two different words used in claims to have two different meanings).

Bonding and embedding are two distinct concepts. Specifically, bonding is an exemplary way to embed pieces 58 in replicated substrate 70. For example, as described in the specification, in the illustrated embodiment of Figure 7, the pads 30 shown in phantom, along with the machined substrate (with the pads 30 and machined substrate together forming modified blank 22') are "bonded" to the replicated substrate 70, with the result that the pads 30 are "embedded" in the assembly. [A62:23-25.] Similarly, "replicated substrate 214 adheres to the flat regions 228 and side walls 230" causing "portions 234 of the replicated substrate 214 [to] protrude into, and bond with, the machined substrate 200 along surfaces 228, 230 to form a compound substrate 236. . . . [and] portions 278, 280 of the

machined substrate 200 [to] remain embedded in the replicated substrate 214 portion of the compound substrate" [A131: 6-28.] Both passages use the terms "bonded" and "embedded" separately to show that bonding is an exemplary way to achieve embedding, indicating that the two terms were intended to mean two different things, and would be understood by a person skilled in the art to have different meanings.

The specification discloses a bonding relationship between machined and replicated substrates in embodiments of the invention, including in the passages the Board quoted, but the specification also clearly states that pieces of machined substrate "remain embedded" in the replicated substrate. The natural reading of the specification is thus that "bonded" and "embedded" are separate and distinct phenomena, *i.e.* there may be a surface bonding relationship between substrates, but regardless of that relationship or whether it exists, portions of one substrate may be "embedded" in – fixed in the surrounding mass of – another substrate.

By analogy, applicants refer to a nail embedded in a wooden post by hammering the nail into the post. The nail is undoubtedly fixed firmly in a surrounding mass (*i.e.* is embedded), but no "bonding" is present. Rather, the nail is held in place by friction. Alternatively, a nail could be embedded in the same wooden post by drilling a hole larger than the diameter of the nail into the surface of the wooden post, filling it with adhesive, and submerging the nail into the

adhesive. In such a case, the nail would be both "embedded" in the post and also "bonded." This common sense example makes clear that "embedding" and "bonding" are distinct and separate concepts and that "bonding" is merely only means to accomplish "embedding."

The fact that the specification repeatedly refers to embodiments including bonding between substrates *and* in which pieces of machined substrate remain embedded in a replicated substrate only supports the point that embedded should be given its ordinary meaning and does not mean the same thing as "bonding" as the Board concluded. *See CAE Screenplates Inc. v. Heinrich Fiedler GmbH & Co. KG*, 224 F.3d 1308, 1317 (Fed. Cir. 2000) (presuming that two different terms had different meanings "[i]n the absence of evidence to the contrary"). And the fact that the specification uses "embedded" in an entirely different context having nothing to do with "bonding" to describe reference pads fixed in a surrounding compound substrate assembly further supports, and indeed compels, the ordinary, accustomed, dictionary-based construction of "embedded." In conflating the concepts and specification language regarding "bonded" and "embedded," the Board failed to give "embedded" its broadest reasonable construction in light of the specification, as this Court's case law requires. *See In re ICON Health & Fitness, Inc.*, 496 F.3d 1374, 1379 (Fed. Cir. 2007) (citing *In re Am. Acad. of Sci. Tech Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004)).

2. The Board's Interpretation of "Embedded" Was Unreasonable in the Context of the Claims

The Board decided that the term "embedded" means "attached to" or "bonded." This definition is illogical and either contradicts or eliminates other claim elements of the appealed claims. Specifically, the pertinent portion of claim 16 recites "machined substrate pieces embedded *in* portions of the structured surface." [A1274-75.] Applicants direct the Court to the fact that the term "in" is not only part of the ordinary dictionary definition of "embedded" but is also a *separate claim element*. Therefore, the meaning of "embedded" has to make sense in the context of being "embedded in," as the claim recites. The Examiner and Board's definition of "embedded" as meaning "attached to" or "bonded" makes no sense with and contradicts the claim itself because the resulting claim would read "pieces *attached to in* portions of the structured surface." In effect, the Board's erroneous definition either contradicts other claim elements because the concepts of "attached to" and "in" are contradictory or the Board's definition reads wholly separate claim elements out of the pending claims, which is improper and in violation of this Court's precedent. Both the Examiner and the Board erroneously ignored this separate claim element when formulating their definition of "embedded." Because the Board's definition of "embedded" is inconsistent with the claims themselves and either contradicts other claim elements or reads them out of the claims, the Board's definition was unreasonable.

3. The Board Made Factual Errors in Its Assessment of the Specification

The Board began its analysis with several findings, in the form of quotations from the specification, relating to bonding between the machined and replicated substrates. [A62:11-16; A63:19-25; A64:11-17 and quoted above.] On the basis of these "findings," the Board affirmed the Examiner's determination that the specification discloses to one of ordinary skill in the art that "the replicated substrate [70] and the machined substrate [28] are only bonded together with [sic, which] creates an interface," and "[t]here is no description in the specification that the machined substrate is ever more than surface bonded in the replicated substrate." [A6.] As explained in greater detail above, both findings are factually incorrect. The specification provides support for the surrounding mass (replicated substrate 70) fixing within it the machined pieces 58. As such, the specification provides support for and is consistent with the machined pieces being constrained or fixed firmly by the replicated substrate. Consequently, the above statements are factually inaccurate.

Further, the Board went on to state that the "Specification makes clear that . . . protrusions 58 . . . are bonded only at top surfaces 62 and not along side surfaces 60, 61." [A6.] This statement is also simply incorrect. The statement that protrusions are bonded only at top surfaces and not along the side surfaces is based on one set of exemplary embodiments shown in Figures 2-11. The Board's

statement, however, ignores another set of exemplary embodiments shown in Figures 12-23 [A94, 96-100.] These exemplary embodiments clearly illustrate discrete machined substrate pieces are bonded along side surfaces: "[d]iscrete pieces or portions 278, 280 of the compound substrate 236 . . . are bonded to the replicated substrate 214 along [side wall] surfaces 230." [A70.]

In sum, the Board acknowledged that it departed from the dictionary definition of "embedded" in reaching its construction, stating its view that "in this instance" it is clear from the specification that the meaning of "embedded" is not limited to its dictionary definition. [A7.] Based on a correct reading of the specification, the lack of any evidence that the Applicants intended otherwise, and this Court's opinions holding that claim terms should be given their ordinary and accustomed meaning in the absence of such evidence, the proper construction of "embedded" is "fixed firmly in a surrounding mass."

For all of the foregoing reasons, this Court should reverse the Board's construction of "embedded" as unreasonable and unsupported by the record and controlling case law, and hold that in the claims on appeal, "embedded" should be given its ordinary and accustomed meaning – "fixed firmly in a surrounding mass." There is no evidence that the Applicants intended to deviate from the ordinary meaning, and the patent specification as a whole fully supports the use of the ordinary meaning of the term.

D. Nilsen Does Not Anticipate the Claims on Appeal

The Board erred in concluding that Nilsen anticipates the claims on appeal. First, with "embedded" correctly construed, Nilsen does not anticipate the claims. Second, with "embedded" construed to mean that the pieces are fixed *by* the surrounding mass, Nilsen does not anticipate the claims. Third, even using the Board's improper and erroneous definition of "embedded," Nilsen does not anticipate the claims.

It is useful, and telling, to review the relevant figures of the presently appealed Application and of Nilsen (Figure 9 of the Application [A94] and Figure 2 of Nilsen [A30], respectively, reproduced below):

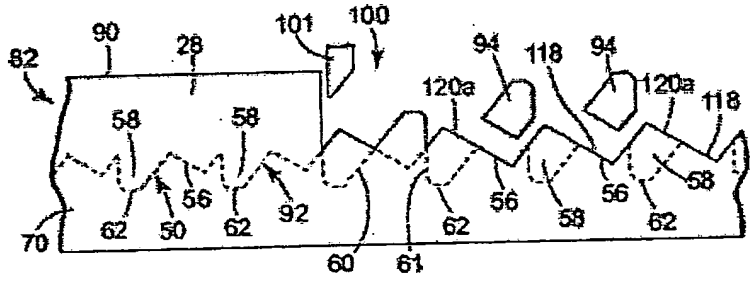


Fig. 9

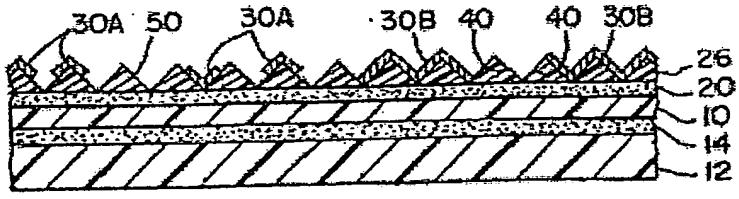


FIG. 2

In Figure 9 of the Application, the machined substrate pieces 58 are fixed three-dimensionally in the surrounding mass of the replicated substrate 70. [A94.] The claims on appeal recite this structure as "a plurality of machined substrate pieces embedded in portions of the structured surface." [A1274-75.] Under the proper construction of "embedded," the machined substrate pieces are fixed firmly in the surrounding mass of the replicated substrate.

Turning to Figure 2 of Nilsen, according to the Board, the microprism structures 26 & 50 correspond to the claimed "replicated substrate having a structured surface," and the surface coated metallic deposits 30A and 30B correspond to the claimed "machined substrate pieces." [A30, A8; *see also* A33, 2:45-50.] As the Examiner and Board admit, the surface coatings are never more than surface bonded onto (not into) the microprisms ("a coating substrate selectively bonded to the microprism substrate" [A8]).

1. With "Embedded" Correctly Construed, Nilsen Does Not Anticipate the Appealed Claims

The Board's finding of anticipation hinges on its erroneous construction of "embedded." In finding anticipation, the Board stated:

> We agree with the Examiner's findings that Nilsen would have disclosed to one of ordinary skill in this art a compound substrate comprising microprism formations 26, which are a replicated substrate having a structured surface,

and metallic deposits 30A-B, which are machined substrate pieces that are embedded in portions of the microprisms 26.

...

In other words, Appellants' disclosed "machine portions are firmly *surface bonded* to the replicated substrate surface and surround[ed] by replicated substrate protrusions . . . [w]hich is the same structure Nilsen shows, e.g. a coating substrate selectively *bonded* to the microprism substrate and the coating substrate surrounded by microprism substrate protrusions."

[A8 (emphases added).]

With "embedded" construed properly to mean "fixed firmly in a surrounding mass," Nilsen does not anticipate the appealed claims for at least the following reasons: (1) the coatings of Nilsen are not *in* the microprisms but are instead *on* the microprisms; and (2) the microprisms of Nilsen are not a *surrounding mass* because they are underneath and covered by the coatings.

Regarding the first point, the coatings of Nilsen are not "in" the microprisms but are instead "on" the microprisms. As argued above, the term "in" is not only part of the ordinary dictionary definition of "embedded" but is also *a separate claim element* ("machined substrate pieces embedded *in* portions of the structured surface" [A1274-75]). Both the Examiner and the Board erroneously ignored this separate claim element in their definition of the term "embedded." The coatings of Nilsen, by Nilsen's, the Board's, and the Examiner's admission are merely coated *on* – never *in* – the microprisms. As such, Nilsen cannot anticipate the appealed claims because it fails to teach each and every claim element.

Regarding the second point, the microprisms of Nilsen are not a *surrounding mass*. The Board stated that "Appellants' claimed "machined substrate portion is embedded, 'fix firmly in a surrounding mass,' in the same sense that Nilsen's coating is fixed firmly in a surrounding mass on the surface of the microprism formations." [A8.] This statement simply does not make sense. Contrary to the Board's vague assertion to the contrary, the microprism structures of Nilsen are not a surrounding mass and do not surround the metallic deposits, which would be the needed configuration in order for anticipation to exist under any construction of "embedded," including the Board's erroneous constructions.

The Board and Examiner merely state that the microsprisms are a surrounding mass without any explanation for that finding. The *American Heritage Dictionary of the English Language* dictionary defines "surround" as "enclosing on all sides, such as a fence." The coatings of Nilsen are only adjacent to the microprisms on a single side. The Board fails to provide a definition for "surround" and instead appears to be suggesting that the Nilsen microprisms generally surround the metallic coatings like a person standing in a forest is generally surrounded by trees. The Board's linguistic hand-waving is in error and fails because the microprisms of Nilsen fail to *surround* the coatings.

2. Even With "Embedded" Incorrectly Construed, Nilsen Does Not Anticipate the Appealed Claims

The Board's first incorrect construction of "embedded" was its re-definition of the dictionary definition to mean "fixed firmly by a surrounding mass." [A6.] Without acquiescing to this definition, even if this definition were found to be correct, Nilsen does not describe a surrounding mass (presumably, the microprisms according to the Board) fixing firmly the coatings. Instead, the coatings of Nilsen, by Nilsen's, the Board's, and the Examiner's admission are merely coated *on* – never *fixed by* – the microprisms. [A8.]

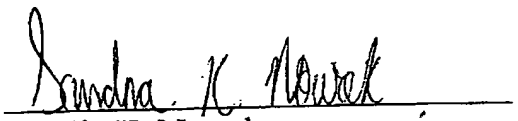
Additionally, as argued above, Nilsen does not anticipate the appealed claims for at least the following additional reasons: (1) the coatings of Nilsen are not *in* the microprisms but are instead *on* the microprisms ([A8]); and (2) the microprisms of Nilsen are not a *surrounding mass* because they are underneath and covered by the coatings ([A33, 2:45-50]).

The Board's second incorrect construction of "embedded" was "attached to" or "bonded." [A7.] Without acquiescing to this definition, even if this definition were found to be correct, Nilsen does not anticipate the appealed claims for at least the following additional reasons: (1) the coatings of Nilsen are not *in* the microprisms but are instead *on* the microprisms ([A8]); and (2) the microprisms of Nilsen are not a *surrounding mass* because they are underneath and covered by the coatings ([A33, 2:45-50]).

For all of the reasons above, the Board's anticipation finding is not supported by substantial evidence and must be reversed. Under the proper construction in which a substrate is "embedded" in another substrate when "fixed firmly in a surrounding mass" of the other substrate, Nilsen cannot anticipate the claims on appeal and the Board's finding must therefore be reversed.

CONCLUSION

For all of the foregoing reasons, Appellants respectfully request that this Court reverse the Board's decision.



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ADDENDUM

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte GERALD M. BENSON
and KENNETH L. SMITH

Appeal 2010-005053
Application 09/515,978
Technology Center 1700

Before ADRIENE LEPIANE HANLON, CHARLES F. WARREN, and CATHERINE Q. TIMM, *Administrative Patent Judges*.

WARREN, *Administrative Patent Judge*.

DECISION ON APPEAL[1]

Applicants appeal to the Board from the decision of the Primary Examiner finally rejecting claims 16-23 and 40 in the Office Action mailed March 16, 2009. 35 U.S.C. §§ 6 and 134(a) (2002); 37 C.F.R. § 1.191(a)(1)

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[1] The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, or for filing a request for rehearing, as recited in 37 C.F.R. § 41.52, begins to run from the "MAIL DATE" (paper delivery mode) or the "NOTIFICATION DATE" (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

(2003); *see also* 37 C.F.R. § 41.31(a) (September 2009).

We affirm the decision of the Primary Examiner.

Claim 16 illustrates Appellants' invention of a compound substrate, and is representative of the claims on appeal:

16. A compound substrate, comprising:

a replicated substrate having a structured surface;

a plurality of machined substrate embedded in portions of the structured surface; and

a plurality of cube corner elements that each form a cube corner pyramid having a machined substrate piece embedded in a portion of the structured surface and that each have at least one compound face including a replicated substrate face and a machined substrate face.

Appellants request review of the ground of rejection under 35 U.S.C. § 102(b) advanced on appeal: claims 16-23 and 40 over Nilsen (U.S. 5,657,162). Br. 6; Ans. 3.

Appellants argue the claims in the ground of rejection as a group. *See generally* Br. Thus, we decide this appeal based on claim 16. 37 C.F.R. § 41.37(c)(1)(vii) (2009).

Opinion

Appellants contend that the Examiner erred in interpreting the claim term "embedded" in the claim language "a plurality of machined substrate pieces embedded in portions of the structured surface [of the replicated substrate]" of representative claim 16, and thus in finding that the claimed compound substrate encompassed by claim 16 is anticipated by Nilsen. Br., e.g., 6-7.

On this record, we cannot subscribe to Appellants' position. In this respect, we are in agreement with the Examiner's interpretation of the claim

term "embedded" in light of evidence in the Specification and finding of anticipation of claim 16 over Nilsen stated in the Answer, to which we add the following for emphasis with respect to Appellants' arguments. Ans. 3-5.

I.

Appellants submit that the interpretation of the term "embedded" is the issue on appeal, arguing that the term must be given its common dictionary meaning of "[t]o fix firmly in a surrounding mass." Br. 6, citing *The American Heritage Dictionary of the English Language* (4th ed., Houghton Mifflin Co., 2000). Appellants contend that the dictionary definition of the term "embedded" reflects the disclosure in the Specification that, in forming replicated substrate 70 over machined substrate 28, as illustrated in Figures 6 and 6a, "[p]ortions of the replicated substrate 70 protrude into the machined substrate 28 to form a compound substrate 82 (see also Fig. 9)." Br. 7-8, citing Spec. 11:5-20. Appellants contend that it is disclosed in the Specification that, as illustrated in Specification Figure 9, "replicated substrate (70) is bonded along at least a portion of the interface with the machined substrate (28)." Br. 8; *see also* Br. 7, citing Spec. 26:19-22. Appellants contend that Specification Figure 9 further illustrates the machining step which removes machined substrate 28 from replicated substrate 70 except for protrusions 58 of machined substrate 28 which "remain embedded in the replicated substrate 70," in forming compound substrate 82. Br. 8, citing Spec. 11:21 to 12:5, and 12:19 to 13:20.

We find that the Specification discloses that, as illustrated in Specification Figure 6a,

> due to the previous passivation and abrasion steps, the replicated substrate 70 adheres to the structured surface 50

> along the top surface 62 of the protrusions 58, but not along the passivation surfaces of the pyramids 56 and the side surfaces 60, 61 of the protrusions 58. Portions of the replicated substrate 70 protrude into the machined substrate 28 to form a compound substrate 82 (see also Fig. 9).

Spec. 11:11-16.

We find that the Specification further discloses that, as illustrated in Specification Figure 9,

> the compound substrate 82 comprises the machined substrate 28 and the un-separated replicated substrate 70. The interface 92 between the structured surface 50 [of machined substrate 28] and the replicated substrate 70 is indicated by dashed line. Bonding at the interface 92, however, is limited to the abraded top surfaces 62 of the protrusions 58 [of machined substrate 28]. The passivation layer prevents or minimizes adhesion along the remainder of the interface 92, such as along the pyramids 56 or the side surfaces 60, 61 of the protrusions 58.

Spec. 12:19-25.

We find the Specification still further discloses that, as illustrated in Specification Figure 9,

> [i]n some embodiments, the tool 101 may cut into the replicated substrate 70 such that the replicated substrate may include a replicated or form portion and a machined portion. The distal ends or top surfaces 62 of the discrete pieces or protrusions 58 from the machined substrate 28 are bonded to the replicated substrate 70. Bottom or proximal portions of the protrusions 58 are machined to form cube corner pyramids 120a. The protrusions 58 on the machined substrate 28 remain embedded in the replicated substrate 70.

Spec. 13:11-17.

On this basis, we are of the opinion that the Examiner correctly found

that the Specification discloses to one of ordinary skill in the art that "the replicated substrate [70] and the machined substrate [28] are only bonded together with [sic, which] creates an interface," and "[t]here is no description in the specification that the machined substrate [28] is ever more than surface bonded in the replicated substrate [70]." Ans. 4-5, citing Spec. 11:5-20. The Examiner thus properly concludes that "the machined portions [58] are firmly surfaced bonded to the replicated substrate surface [70] and surrounded by replicated substrate [70] protrusions." Ans. 5. Indeed, the disclosure in the Specification makes clear that, as illustrated in Specification Fig. 9, protrusions 58 are pieces of machined substrate 28 which remain in replicated substrate 70 after machining, and which are bonded only at top surfaces 62 and not along side surfaces 60, 61.

Thus, we cannot agree with Appellants' position that the Specification supports the common dictionary meaning of the term "embedded." Indeed, the definition of "embedded" relied on by Appellants reads: "1. To fix firmly in a surrounding mass: *embed a post in concrete; fossils embedded in shale.*" *The American Heritage Dictionary of the English Language* 583. We determine that this definition of "embedded" means that the surrounding mass holds in place the object embedded, which comports with the other definitions of the term: "2. To enclose snugly or firmly. 3. To cause to be an integral part of a surrounding whole: *'a minor accuracy embedded in a larger untruth' (Ian Jack).*" *Id.*

Indeed, on this record, there is no evidence in the disclosure in the Specification that the protrusions 58 pieces remaining in substrate 70 are fixed firmly by the surrounding mass of replicated substrate 70 which would

occur if the protrusions 58 pieces are "embedded" in replicated substrate 70 as specified in the dictionary definition. Indeed, to the contrary, the disclosed bonding of the remaining protrusions 58 pieces to replicated substrate 70 is only at top surfaces 62 and not along side surfaces 60, 61.

We recognize that in giving the term "embedded" the broadest reasonable interpretation in light of the usage of the term in the Specification; we have expanded the meaning of "embedded" beyond its common dictionary meaning. However, in this instance, it is clear from the disclosure in the Specification that the meaning of "embedded" is not limited to the dictionary definition. *See, e.g., In re Icon Health and Fitness, Inc.*, 496 F.3d 1374, 1379 (Fed. Cir. 2007); *Phillips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir. 2005); *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997).

Accordingly, we are of the opinion that the claim language "a plurality of machined substrate pieces embedded in portions of the structured surface [of the replicated substrate]" of representative claim 16, means that protrusions 58 pieces of machined substrate 28 are attached to a surface of replicated substrate 70 and otherwise surrounded to any extent by replicated substrate 70.

II.

Appellants contend "that Nilsen neither describes nor shows discrete pieces that are fixed firmly *in a surrounding mass*," as claimed, but instead, shows "forming 'transparent reflective metallic deposits *on the surface of* the microprism formations.'" Br. 6, citing Nilsen col. 2, ll. 64-65, and Fig. 2; *see also* Br. 9-12. In other words, "[i]n contrast [to a plurality of

machined substrate embedded in portions of the structured surface as claimed], the metallic deposits of Nilsen are, by Nilsen's own admission, merely *coated on the surface of* the microprisms and not enclosed in anything." Br. 11.

We agree with the Examiner's findings that Nilsen would have disclosed to one of ordinary skill in this art a compound substrate comprising microprism formations 26, which are a replicated substrate having a structured surface, and metallic deposits 30A-B, which are machined substrate pieces that are embedded in portions of microprisms 26. Ans. 3, citing Nilsen col. 2, ll. 43-44. *See also* Nilsen col. 2, ll. 35-50 and 60-67. In these respects, we find that Nilsen would have disclosed to one of ordinary skill in the art an embodiment illustrated in Nilsen Figure 2 wherein metallic deposits 30B are coated on the surface of and surrounded by microprism formations 26. Nilsen col. 2, ll. 44-50.

Thus, contrary to Appellants' position, we agree with the Examiner's finding that Appellants' claimed "machined substrate portion is embedded, 'fix firmly in a surrounding mass,' in the same sense that Nilsen's coating is fixed firmly in a surrounding mass on the surface of the microprism formations." Ans. 4; *see also* Ans. 5. In other words, Appellants' disclosed "machined portions are firmly surfaced bonded to the replicated substrate / surface and surround[ed] by replicated substrate protrusions . . . [w]hich is the same structure Nilsen shows, e.g., a coating substrate selectively bonded to the microprism substrate and the coating substrate surrounded by microprism substrate protrusions." Ans. 5. This is all that claim 16 requires.

Accordingly, on this record, the Examiner has established, as a matter of fact, that Nilsen Figure 2 describes to one skilled in this art each and every limitation of the claimed invention encompassed by claim 16 arranged as required therein within the meaning of § 102(b). *See, e.g., Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 772 (Fed. Cir. 1983) (anticipation is established when the claim reads on something disclosed in the reference which meets all of the limitations of the claim).

III.

Accordingly, based on our consideration of the totality of the record before us, we have weighed the evidence of anticipation found in Nilsen with Appellants' countervailing evidence of and argument for non-anticipation and conclude, by a preponderance of the evidence and weight of argument, that the claimed invention encompassed by appealed claims 16-23 and 40 would have been anticipated as a matter of fact under 35 U.S.C. § 102 (b).

The Primary Examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

bar

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte GERALD M. BENSON
and KENNETH L. SMITH

Appeal 2007-2987
Application 09/515,978
Technology Center 1700

Decided: November 30, 2007

Before CHARLES F. WARREN, THOMAS A. WALTZ, and CATHERINE Q. TIMM, *Administrative Patent Judges*.

WARREN, *Administrative Patent Judge*.

DECISION ON APPEAL

Applicants appeal to the Board from the decision of the Primary Examiner finally rejecting claims 16 through 23 and 40 in the Office Action mailed April 13, 2004. 35 U.S.C. §§ 6 and 134(a) (2002); 37 C.F.R. § 1.191(a)(1) (2003); *see also* 37 C.F.R. § 41.31(a) (September 2004).

We affirm the decision of the Primary Examiner.

Claims 16, 20, and 40 illustrate Appellants' invention of a compound substrate, and are representative of the claims on appeal:

16. A compound substrate comprising a substantially replicated substrate having a structured surface and a discontinuous machined substrate covering only a portion of the structured surface, the compound substrate also comprising at least one geometric structure comprising a cube corner element that has at least one face disposed on the replicated substrate and at least another face disposed on the machined substrate.

20. A compound substrate comprising a substantially replicated substrate and a machined substrate, the replicated substrate having a structured surface and the machined substrate disposed in discrete pieces on the structured surface [sic] each of the replicated and machined substrates having an exposed surface that defines a face of a cube corner element on the compound substrate.

40. A compound substrate having a structured surface comprising a substantially replicated portion and a machined portion, the compound substrate further comprising at least one compound face thereon wherein the at least one compound face has a substantially planar surface having a first face portion on the machined portion of the compound substrate and a second face portion on the substantially replicated portion of the substrate, the first and second face portions being on opposite sides of a transition line.

The Examiner relies upon the evidence in these references (Answer 3):

Bacon, Jr. (Bacon)	5,614,286	Mar. 25, 1997
Nilsen	5,657,162	Aug. 12, 1997

Appellants request review of the grounds of rejection under 35 U.S.C. § 102(b) advanced on appeal: claim 40 as anticipated by Bacon; and claims 16 through 23 and 40 as anticipated by Nilsen. Br. 3; Ans. 3 and 5.

Appellants argue independent claims 16, 20, and 40 with dependent claims 17 through 19, 21, and 22 standing or falling with their respective independent claims. Br. 3. Thus, we decide this appeal based on claims 16,

20, and 40.[1] 37 C.F.R. § 1.192(c)(7)(2004); *see also* 37 C.F.R. § 41.37(c)(1)(vii)(September 2004).

The principal issues in this appeal are whether the Examiner has carried the burden of establishing a prima facie case of anticipation in each of the grounds of rejection advanced on appeal.

With respect to claim 40, the Examiner explains in graphic detail that the conformable cube corner retroreflective sheeting illustrated in Bacon's Fig. 1 is a compound substrate having a structured surface of "discrete cube corner segments (substrate and discontinuous substrate with faces)" comprising replicated and machined substrates providing a compound face with a transition line between the two face portions, wherein a face portion is provided by each of the replicated and machined portions. The Examiner finds that the structural features of the conformable cube corner retroreflective sheeting illustrated in Bacon's Fig. 1 meet the limitations of claim 40. Ans. 4 (emphasis omitted). With respect to claims 16, 20, and 40, the Examiner explains in graphic detail that the retroreflective article with multiple prisms illustrated in Nilsen's Fig. 2 is a compound substrate having a structured surface of a replicated substrate that has " a solid cube corner microprism (substrate with faces) coated with a discontinuous metallic layer

[1] We do not separately consider claim 23 with respect to the second ground of rejection. With respect to this ground, Appellants state "Claims 20-23 stand or fall together" and then state that Nilsen fails to disclose a structural element "made by replication of the compound substrate of claim 20" as specified in claim 23. Br. 3 and 6. The Examiner, noting the inconsistent positions, addresses only independent claim 20, thus holding "argument regarding claim 23 . . . moot." Ans. 11. In the Reply Brief, Appellants state "[t]he grouping of claims set forth in the Appeal Brief is correct" and do not dispute the Examiner's determination that dependent claim 23 stands or falls with independent claim 20. Reply Br. 2.

(discontinuous substrate with faces . . .)" as a machined substrate, wherein a microprism comprises a cube corner element that has one face disposed on the replicated substrate and another face disposed on the machined substrate, with the respective faces of the compound face separated along a transition line. The Examiner finds that the structural features of the retroreflective article with multiple prisms illustrated in Nilsen's Fig. 2 meet the limitations of claims 16, 20, and 40. Ans. 5-6 (emphasis omitted).

Appellants submit that the references do not anticipate the claims because neither reference discloses a "machined substrate." Br. 5-7. Appellants contend Bacon's sheet "is a microreplicated sheet" that has "no machined surfaces." Br. 5, citing Bacon col. 3, l. 65 to col. 4, l. 33, col. 6, l. 64 to col. 7, l. 15, and col. 13, l. 13 to col. 14, l. 42. Appellants contend "Nilsen also fails to disclose a machined substrate." Br. 5, citing Nilsen col. 2, ll. 35-45, and col. 3, ll. 7-19.

Appellants submit the claim terms "machined substrate" and "machined portion" impart structural limitations as the terms are used in the Specification, and thus, "it is clear that the compound substrates of claims 16-22 and 40 . . . are different from the replicated surfaces of either Nielsen or Bacon." Br. 3-5; *see also* Br. 5-7. Appellants contend the term "'[m]achined' is used to describe a surface that results when material has been physically removed from a blank to form the desired substrate or surface," pointing out that a number of different machining processes using different material removal means are disclosed in the Specification. Br. 4, citing Spec. 9:1-12 and 9:26 to 10:5. Appellants contend that different material removal means impart different surface features to the substrate which "makes it impossible to generically define the surfaces in purely

structural terms." Br. 4. Appellants contend "the structure implied by a seeming process term should be considered in assessing patentability where the product can only be defined by the process steps by which it is made or where the process steps would be expected to impart distinctive structural characteristics to the final product," citing process terms such as, among other things, "welded" and "press fitted." Br. 4.

Appellants submit "that a machined substrate and a replicated substrate are structurally different from one another." Br. 4. Appellants contend "a machined substrate has surface features that result when the material is removed from the blank" and "the surface of a machined substrate has a crystal structure that is the same as the balance of the substrate." Br. 4. Appellant contends "[a] replicated substrate . . . is a negative reproduction of a pre-existing surface" and "has a different crystal structure than that of the balance of the substrate." Br. 5.

Appellants further contend with respect to claim 40, that "a transition line . . . separates the machined portion from the replicated portion of the substrate." Br. 7. In this respect, Appellants contend Bacon's "reference numeral 50 represents the side walls of discrete replicated cube corner segments" and "[s]ince there are no machined substrates or portions in Bacon, Bacon cannot have a transition line." Br. 7. Similarly, Appellants contend "the joinder of metallic deposit 30A to the prism 50" in Nilsen's Fig. 2 "does not provide a transition line that separates the machined and replicated features." Br. 7.

The Examiner responds that in view of the claim terms "machined substrate" and "machined portion," claims 16, 20, and 40 are drawn in product in product-by-process format, and in this respect, are given their

broadest reasonable interpretation in light of the Specification. Ans. 7. The Examiner contends these terms have not been defined by Appellants in the Specification and thus, "have been given their broadest reasonable interpretation of a substrate or portion made by a machine." Ans. 7 and 8. The Examiner contends the passages of the Specification relied on by Appellants to provide a definition of "machined substrate/portion" instead "discuss several different processes that end in the same 'machined substrate/portion' which results in a discontinuous cube corner structure." Ans. 8-9. The Examiner determines claims 16, 20, and 40 do not contain specific limitations on the method of making a "machined substrate" or "machined portion." Ans. 8.

The Examiner contends Appellants' arguments with respect to the structural differences between a machined substrate and a replicated substrate do not point out how the respective substrates differ, stating only "that the machined and replicated substrates are made by a different process." Ans. 9. The Examine contends that a reasonable interpretation "of the claimed invention in light of the specification is a compound substrate comprising a continuous substrate, i.e., the replicated substrate, with a structured surface and a discontinuous substrate, i.e., the machined substrate, covering a portion . . . [of] the structured surface of the continuous substrate," wherein "[t]he compound substrate further comprising at . . . [least one] corner element that has at least one face disposed on the continuous substrate and another face disposed on the machined substrate." Ans. 9-10.

The Examiner contends Bacon's cube corner retroreflective sheeting is made with a mold and thus, by a machine, providing "a machined

substrate/portion." Ans. 7 and 10, citing Bacon col. 3, l. 65 to col. 4, l. 19. The Examiner contends Nilsen's metallic layer is vacuum deposited or otherwise treated to selectively form transparent reflective metallic deposits on the surface of some of the microprisms, thus forming a metallic "machined substrate" on the microprism "replicated substrate." Ans. 7 and 10, citing Nilsen col. 2, ll. 45-49.

The Examiner contends the claim term "transition line" as defined in the Specification "as a line or other elongated feature that separates constituent faces of a compound face," and thus "is a line between the machined substrate face and the replicated substrate face," which is found in the relied upon illustrated embodiments of Bacon and Nilsen. Ans. 12, citing Spec. 26:13-18 and 28:25-26.

Appellants reply that the claims cannot be anticipated by Bacon and by Nilsen because the references do not describe the presence of both a machined substrate/portion and a replicated substrate/portion. Reply Br. 3 and 4. In this respect, Appellants contend Bacon creates a structured surface by molding, which is a replication process, and the segments of the structured surface are subsequently created from that molded surface, with the result that "adjacent segments cannot be different from one another,' i.e., "one cannot be machined and other replicated." Reply Br. 3. Appellants contend that thus, Bacon's structured surface is "either all machined or all replicated," and points out that the Examiner's position is that the structured surface is created by a "machine." Reply Br. 3. Appellants further contend Nilsen's vapor deposited metallic layer on portions of the structured surface replicates that surface, and is not machined. Reply Br. 3-4.

The issues framed by the Examiner and Appellants entail the interpretation of independent claims 16, 20, and 40 by giving the terms thereof the broadest reasonable interpretation in their ordinary usage in context as they would be understood by one of ordinary skill in the art, in light of the written description in the Specification unless another meaning is intended by Appellants as established therein, and without reading into the claim any disclosed limitation or particular embodiment. *See, e.g., In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004); *In re Hyatt*, 211 F.3d 1367, 1372 (Fed. Cir. 2000); *In re Morris*, 127 F.3d 1048, 1054-55 (Fed. Cir. 1997); *In re Zletz*, 893 F.2d 319, 321-22 (Fed. Cir. 1989).

Each of claims 16 and 20 specify any manner of "compound substrate" comprising at least any substantially *replicated substrate* having any manner of "structured surface" having a "cube corner element," and any manner of *machined substrate* that discontinuously covers only any portion of the "structured surface" of the *replicated substrate*, including discrete pieces of a *machined substrate* on the "structured surface" of the substantially *replicated surface*. In claim 16, the "compound substrate" further comprises at least any manner of a "geometric structure" comprising at least a "cube corner element" having one "face" disposed on the *replicated substrate* and another "face" deposed by the *machined substrate*. In claim 20, an exposed surface of each of the *replicated substrate* and the *machined substrate* defines a "face" of a "cube corner element" on the "compound substrate."

Claim 40 specifies any manner of "compound substrate" having any "structured surface" comprising at least any substantially *replicated portion*, any manner of *machined portion*, and any manner of at least one "compound

face" having a substantially planar surface. The "compound face" has a first "face portion" on the *machined portion* and a second "face portion" on the substantially *replicated portion*, and the first and second "face portions" are on opposite sides of a *transition line*.

In the Specification, the term "compound substrate" is defined as "a substrate formed from a machined substrate having a structured surface and a replicated substrate (collectively referred to as 'layers') bonded along at least a portion of the interface with the machined substrate" and "[o]ne or more of the layers of the compound substrate may be discontinuous." Spec. 26:19-22. The term "structured surface" is defined as "a surface that has a plurality of distinct faces arranged at various orientations." Spec. 28:19-20. The term "cube corner element" is defined as "a set of three faces that cooperate to retroreflect light or to otherwise direct light to a desired location," wherein "[s]ome or all of the faces can be compound faces;" and as "a set of three faces that itself does not retroreflect light or otherwise direct light to a desired location, but that is copied (in either a positive or negative sense) in a suitable substrate forms a set of three faces that does retroreflect light or otherwise direct light to a desired location." Spec. 26:25-27; *see also* 1:19-22; *cf.* 28:1-8 and 3:23 to 4:5. The term "compound face" is defined as "a face composed of at least two distinguishable faces (referred to as 'constituent faces') that are approximate each other" and "substantially aligned with one another." Spec. 26:13-15. The term "face" is defined as "a substantially smooth surface." Spec. 27:16. The term "geometric structure" is defined as "a protrusion or cavity having a plurality of faces." Spec. 27:17. The term "structured" is defined as "when used in connection with a surface means a surface that has a plurality of distinct

faces arranged at various orientations." Spec. 28:19-20. The term "transition line" is defined as "a line or elongated feature that separates constituent faces of a compound face." Spec. 28:25-26.

In each of claims 16, 20, and 40, the compound substrate comprises at least a structured surface provided by a "machined substrate" layer having any manner of structured surface by definition and claim language, and a structured surface provided by a "replicated substrate" layer having any manner of structured surface by claim language. The claim language and definitions limit the "structured surface" of the respective substrates to the extent that a face of a cube corner element and a face of a compound face is provided by each of a "machined substrate" layer and a "replicated substrate" layer, each face being a substantially smooth, that is, planar, surface to any extent. The "machined substrate" layer must be discontinuous by claim language in claim 16 and can be discontinuous in claims 20 and 40 by definition. We find no claim limitation or definition in the Specification limiting the material of any specified "substrate" layer, and thus, the substrate material must be capable of providing such "structured surface" layers when "machined" and/or "replicated." We consider the terms "replicated portion" and "machined portion" in claim 40 in the same manner as the terms "replicated substrate" and "machined substrate" in claims 16 and 20.

The claim terms "machined" and "replicated" indicate mechanical processing, as Appellants point out, but the claims do not contain any process step limitation(s) on such processes, as the Examiner points out. We determine that the term "machined" does not connote a particular result as does "welding" wherein two pieces of metal are joined by heating, forming a

weld joint. As Appellants point out, the term "machined" is used in the Specification in the structure forming sense of "to cut" material from a substrate, which is part of its ordinary dictionary meaning of "[t]o cut, shape, or finish by machine."[2]

We find the term "replicated" is used in the Specification in the structure modifying sense of making one structured surface by duplicating another structured surface. Thus, this term has the ordinary dictionary meaning of "to duplicate, copy, reproduce, or repeat."[3] We notice that it is well known that a structure of one substrate surface can be replicated in a second substrate by, e.g., machining methods, such as cutting, as well as other duplicating methods, such as molding. Indeed, molding is a form of "shaping" a substrate as is cutting, and molding methods can be performed by a variety of machines including a mold, a press, and an embossing roller. In this respect, the thus "replicated" surface results from a "machined" substrate. Furthermore, as the Examiner points out, there is no requirement in any claim language or definition that the structured surface layers as "machined" and as "replicated" must be structurally different in any respect. Indeed, we find no basis in the claim language or in the Specification which supports Appellants' contentions that the "machined" and "replicated" substrate layers can be distinguished on the basis of the crystallinity of the resulting substrate.

We further do not find in the claim language or definitions in the Specification any requirement that the formation of the structured surface of

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[2] *See, e.g.*, **machined**, *The American Heritage Dictionary of The English Language* 1047 (4th ed., Boston, Houghton Mifflin Company, 2000).
[3] *See, e.g.*, **replicated**, *The American Heritage Dictionary of The English Language* 1480 (4th ed., Boston, Houghton Mifflin Company, 2000).

the "machined substrate" layer and that of the "replicated substrate" layer must be connected to any extent. Indeed, we find no basis in the claim language or in the disclosure in the Specification to read the illustrative embodiments in the Specification into the claims as limitations. *See, e.g., Zletz*, 893 F.2d at 321-22.

The claim term "transition line" in claim 40 is, by definition, a line or elongated feature that separates at least two distinguishable constituent faces of a compound face on the compound substrate, wherein one face or "face portion" is on a "machined portion" layer and a second face or "face portion" is on a "replicated portion" layer and thus, on opposite sides of the "transition line." There is no definition of the "elongated feature" in the Specification or specified in the claim, and thus the same can be a gap or groove between the two otherwise approximate and substantially aligned faces of the compound face. Indeed, claim 40 requires that the constituent faces of the compound face are located on different layers which must necessarily have a line or elongated feature therebetween.

Accordingly, on this record, we determine, as a matter of law, that claims 16, 20, and 40 encompass a product characterized by the process by which it is made because of the claim terms "machined substrate" and "replicated substrate." *See, e.g., In re Thorpe*, 777 F.2d 695, 696-97 (Fed. Cir. 1985), and cases cited therein. Therefore, applying the broadest reasonable construction to the terms of the claims in light of the Specification, the claimed compound substrates encompassed by claims 16, 20, and 40 include compound substrates with at least two layers which can be prepared by machining in any manner a substrate to obtain a "machined substrate" or "machined portion" layer having a specified "structured

surface" and by replicating in any manner a structured surface onto a substrate to obtain a specified "replicated substrate" or "replicated portion" layer, wherein the "structured surface" and the materials of the respective substrate or portion layers can be the same or different.

We find Bacon would have described to one skilled in this art, with reference to Fig. 1, conformable cube corner retroreflective sheeting 10 having a plurality of discrete cube corner segments 12 conformably bonded together, wherein each cube corner segment 12 comprises a plastic body portion 14 having side walls at 50 with at least one cube corner retroreflective element 20 defining cube corner point side 22. Bacon, e.g., col. 2, l. 59 to col. 3, l. 41, col. 6, l. 44 to col. 7, l. 55, and Fig. 1. The cube corner segments 12 are defined by a pattern of separations at 50 such as a plurality of contiguous polygons selected from, among other things, triangles and hexagons, and "[e]ach cube corner retroreflective element 20 comprises a plurality of (e.g., three) . . . faces . . . defined in part by a plurality of microreplicated grooves 32." Bacon, e.g., col. 3, ll. 42-45, col. 6, l. 64 to col. 7, l. 4, and Fig. 1. The conformable cube corner retroreflective sheeting 10 can be made using a tool providing a molding surface and pressing heated thermoplastic sheeting onto the molding surface to form a plurality of cube corner segments 12 and dividing the molded sheet into a plurality of segments 12 by forming sidewalls 50. Bacon, e.g., col. 4, ll. 41-65, and col. 13, l. 13 to col. 14, l. 42.

We find Nilsen would have described to one skilled in this art, with reference to Fig. 2, a retroreflective article with multiple size prisms 50 on solid microprism formation 26, formed by molding, are pattern metallized on side facets, that is, faces, 40 of prisms 50, such as by vacuum

metallization or printing, to form discontinuous metal coatings 30A-B, leaving some prisms 50 uncoated. Nilsen, e.g., col. 1, ll. 42-60, col. 2, ll. 35-50, col. 3, ll. 7-19, col. 3, l. 36 to col. 4, l. 14, col. 4, ll. 35-40, and Fig. 2. "The microprisms 26 are closely spaced and can be described as cube corner formations." Nilsen col. 2, ll. 60-61.

We find Appellants acknowledge in the Specification that direct machining techniques, in which a "series of grooved side surfaces are formed in the plane of a planar substrate," have "the ability to accurately machine very small cube corner elements," wherein "a large number of individual faces are typically formed in a continuous motion of the cutting tool," are known in the art. Spec. 2:23 to 3:11.

There is no dispute that each of Bacon and of Nilsen in fact describe articles having cube corner elements and compound faces which correspond to the structure elements of the structured surface of a compound substrate article as claimed, in the manner graphically shown by the Examiner in the Answer. *See above* pp. 3-4. Upon comparing the claimed compound substrate article encompassed by claims 16, 20, and 40, as we interpreted these claims above, with the descriptions of compound substrate articles in Bacon and Nilsen relied upon, we agree with the Examiner that prima facie as a matter of fact the claimed and reference articles reasonably appear to be identical in all claim elements. *See, e.g., In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997); *In re Spada*, 911 F.2d 705, 708 (Fed. Cir. 1990). Thus, the burden is shifted to Appellants to patentably distinguish the claimed articles by the submission of affective argument and/or objective

evidence. *See, e.g., In re Best*, 562 F.2d 1252, 1255-56 (CCPA 1977);[4] *In re Skoner*, 517 F.2d 947, 950-51 (CCPA 1975); *cf. Spada*, 911 F.2d at 708-09.[5]

Appellants' contentions that the claimed articles distinguish over the prior art articles by reason of the specified "machined" method by which at least one layer of the claimed article is formed, and thus, of a "transition line" between "machined" and "replicated" layers, are not supported by sufficient argument or evidence. Indeed, Appellants do not establish that the "replicated" layers of Bacon and of Nilsen and the patterned, discontinuous metal layer of Nilsen cannot be prepared by machining, such as by known direct machining techniques, or otherwise have different surface structures and/or other characteristics than exhibited by layers that are "machined."

[4] Where, as here, the claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes, the PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his claimed product. See *In re Ludtke*, [441 F.2d 660 (CCPA 1971)]. Whether the rejection is based on "inherency" under 35 U.S.C. § 102, on "prima facie obviousness" under 35 U.S.C. § 103, jointly or alternatively, the burden of proof is the same, and its fairness is evidenced by the PTO's inability to manufacture products or to obtain and compare prior art products. [Footnote and citation omitted.]

Best, 562 F.2d at 1255.

[5] The Board held that the compositions claimed by Spada "appear to be identical" to those described by Smith. While Spada criticizes the usage of the word "appear," we think that it was reasonable for the PTO to infer that the polymerization by both Smith and Spada of identical monomers, employing the same or similar polymerization techniques, would produce polymers having the identical composition.

Spada, 911 F.2d at 708.

See, e.g., Spada, 911 F.2d at 708-09; *Thorpe*, 777 F.2d at 696-97; *Best*, 562 F.2d at 1255-56; *Skoner*, 517 F.2d at 950-51. Indeed, with respect to claim 40, in Bacon, each cube corner segment 12 with sidewalls 50 is a separate layer and all such layers form the compound substrate article 10. In this respect, the sidewalls 50 of adjacent segment 12 layers constitute a "transition line" where sidewall 50 is formed along groove 32, separating faces of a cube corner retroreflective element 20 that are in the respective surfaces of the adjacent segment layers 20, as the Examiner contends. Thus, the adjacent segment layers 12 appear to be identical and, on this record, can reasonably be "machined" or "replicated."

Accordingly, based on our consideration of the totality of the record before us, we have weighed the evidence of anticipation found in Bacon and in Nilsen with Appellants' countervailing evidence of and argument for non-anticipation and conclude that the claimed invention encompassed by appealed claims 16 through 23 and 40 would have been anticipated as a matter of fact under 35 U.S.C. § 102(b).

The Primary Examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv) (2007).

AFFIRMED

tf/ls

Appeal 2007-2987
Application 09/515,978

3M INNOVATIVE PROPERTIES COMPANY
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US005657162A

United States Patent [19]

Nilsen et al.

[11] Patent Number: 5,657,162

[45] Date of Patent: Aug. 12, 1997

[54] RETROREFLECTIVE ARTICLES WITH MULTIPLE SIZE PRISMS IN MULTIPLE LOCATIONS

[75] Inventors: Robert B. Nilsen, Weatogue; Michael Hanrahan, Danbury, both of Conn.

[73] Assignee: Reflexite Corporation, Avon, Conn.

[21] Appl. No.: 507,599

[22] Filed: Jul. 26, 1995

[51] Int. Cl.[6] G02B 5/124

[52] U.S. Cl. 359/530; 359/529; 359/531; 359/532; 359/533; 359/900

[58] Field of Search 359/529–533, 359/900, 515–526; 156/247, 60; 264/1.9; 428/161, 167, 172

[56] References Cited

U.S. PATENT DOCUMENTS

Re. 30,892	3/1982	Bingham et al.	428/241
2,167,149	7/1939	Grote	40/135
3,374,044	3/1968	Benson .	
3,388,027	6/1968	Altman	161/4
3,420,597	1/1969	Nellessen et al. .	
3,493,286	2/1970	Bacon, Jr. .	
3,496,006	2/1970	Rideout et al.	117/45
3,567,307	3/1971	Rideout et al. .	
3,614,199	10/1971	Altman .	
3,684,348	8/1972	Rowland .	
3,700,305	10/1972	Bingham .	
3,802,944	4/1974	Tung	161/3.5
3,924,929	12/1975	Holmen et al. .	
3,975,083	8/1976	Rowland .	
4,025,159	5/1977	McGrath .	
4,082,426	4/1978	Brown .	
4,099,838	7/1978	Cook et al. .	
4,145,112	3/1979	Crone et al. .	
4,153,412	5/1979	Bailey	8/2.5 A
4,555,161	11/1985	Rowland .	
4,618,518	10/1986	Pricone et al.	428/40
4,637,950	1/1987	Bergeson et al.	428/168
4,763,985	8/1988	Bingham .	
4,801,193	1/1989	Martin .	
5,229,882	7/1993	Rowland	359/530
5,412,187	5/1995	Waltens et al.	219/728

FOREIGN PATENT DOCUMENTS

2 245 985	1/1992	United Kingdom .

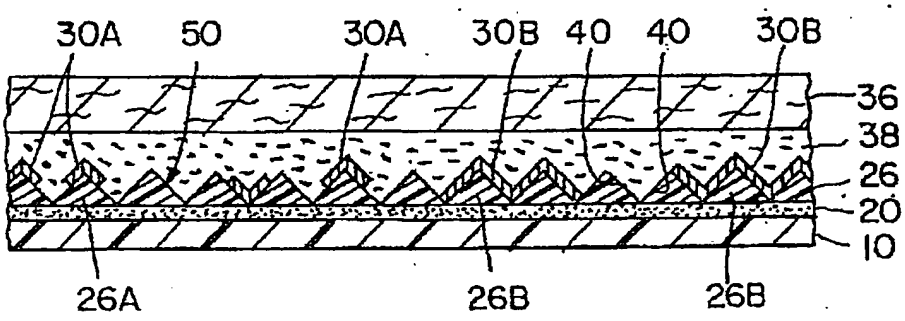
Primary Examiner—James Phan

Attorney, Agent, or Firm—Hamilton, Brook, Smith & Reynolds, P.C.

[57] ABSTRACT

Retroreflective sheeting and articles are formed in which the size of the retroreflective and non-retroflective surfaces may be varied across an array of microprisms. This is accomplished by varying the location of the reflective coating applied to the microprism side facets, such that, some prism side facets are completely coated with reflective material while others are coated only at the apex area; and still others are coated with a non-reflective coatings, such as, a colored adhesive.

15 Claims, 3 Drawing Sheets



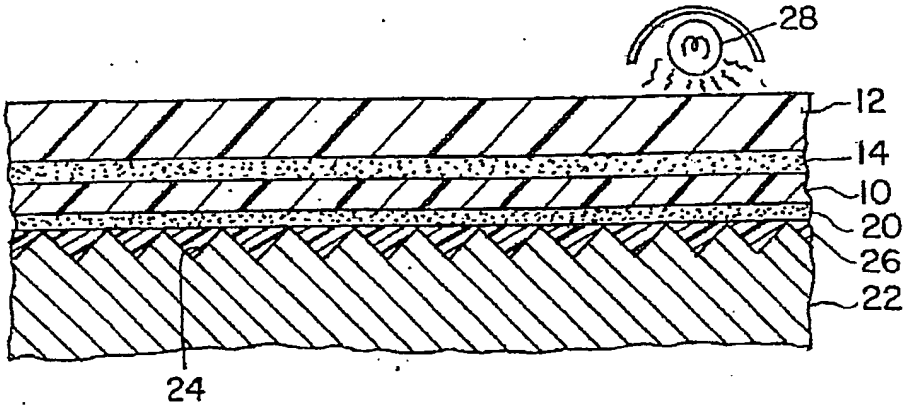


FIG. 1
PRIOR ART

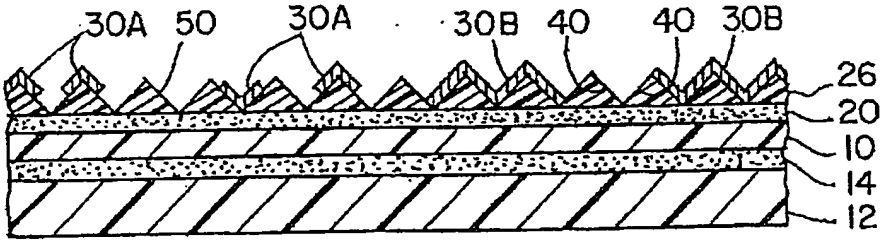


FIG. 2

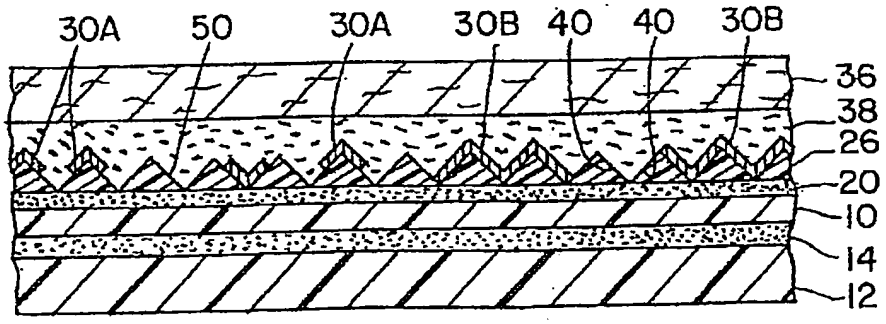


FIG. 3

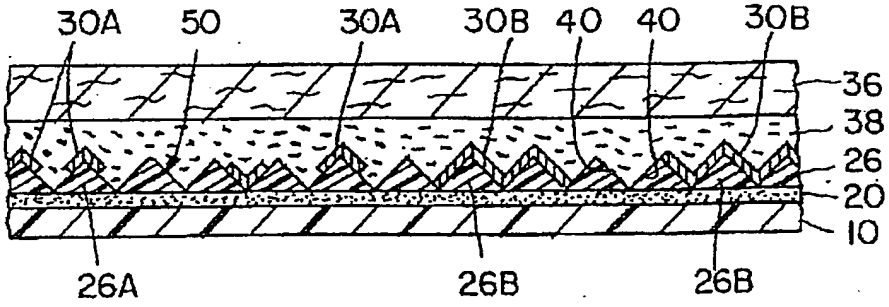

30A
50
30A
30B
40
40
30B
36
38
26
20
10
26A
26B
26B

FIG. 4

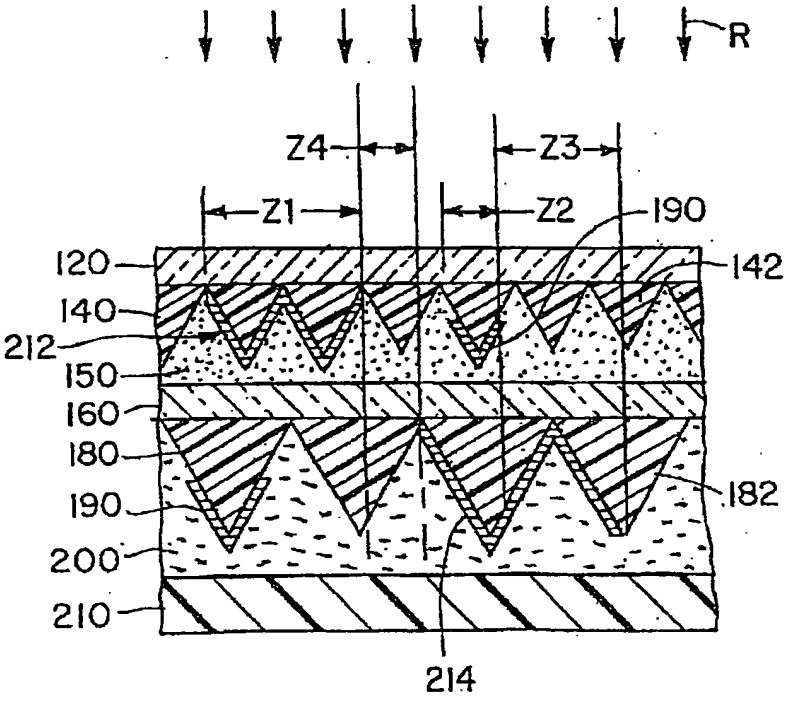

R
Z4
Z3
Z1
Z2
190
120
142
140
212
150
160
180
182
190
200
210
214

FIG. 5

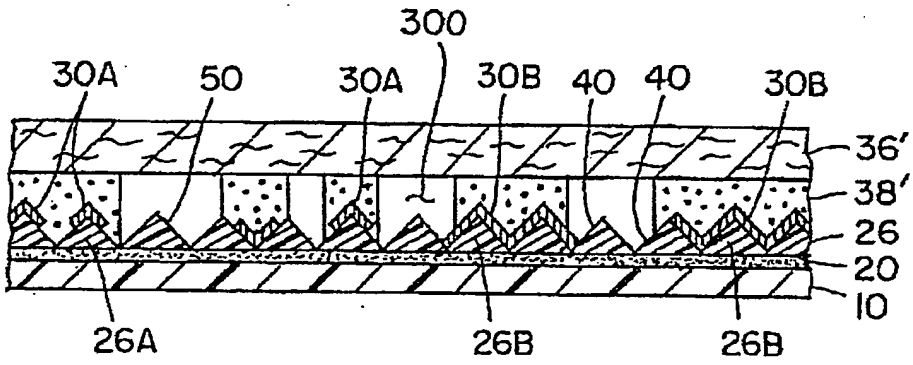


FIG. 6

RETROREFLECTIVE ARTICLES WITH MULTIPLE SIZE PRISMS IN MULTIPLE LOCATIONS

BACKGROUND OF THE INVENTION

Retroreflective sheet material is widely employed for a variety of safety and decorative purposes, and is particularly useful when the need for night time visibility is significant under conditions of low ambient light. In retroreflective materials, the light rays impinging upon the front surface are reflected back towards the source of the illumination in a substantially parallel path. In situations where headlights or search lights on boats and aircraft are the only source of illumination, this ability to retroreflect the bulk of the rays falling thereon is especially significant for warning signs.

Among the applications for such retroreflective materials are reflective tapes and patches for clothing of firemen, reflective vests and belts, bands for posts and barrels, traffic cone collars, highway signs, warning reflectors, and the like.

In U.S. Pat. No. 4,801,193 granted Jan. 31, 1989 (incorporated herein in its entirety by reference), there is described in detail a partially retroreflective sheet producing process in which grid patterns of metallized and unmetallized prisms are formed, and the use of adhesive spacing to provide an air backing for unmetallized prisms.

U.S. Pat. No. 5,229,882 granted Jul. 20, 1993 (incorporated herein in its entirety by reference) describes in detail a process for producing retroreflective microprism material providing a visual coloration, wherein some of the microprisms have a retroreflective interface and the remainder have a colored non-reflective coating thereon.

As a result, light rays entering the front or base face which impinge upon the prism side facets having retroreflective interfaces are redirected so that they exit the material in a parallel path i.e. retroreflect. Light rays which travel to the facets of color coated prisms are refracted from those prisms and impart a visual coloration to the material in daylight and ambient light.

SUMMARY OF THE INVENTION

In accordance with the present invention, retroreflective sheeting and articles are formed of multiple size prismatic reflectors located in multiple locations. The multiple size reflectors are formed by selectively applying a reflective coating to the side facets of selected portions of microprisms in an array, followed by application of a colored adhesive coating to the uncoated facets of the array.

Certain of the prism facets in the array are only reflectively coated in the tip area of the prism facets, where the side facets meet at the apex. Such prisms will retroreflect like a small prism versus areas where the entire prism side facets surface is coated. Uncoated areas with a colored adhesive backing will diffusely reflect light.

The pattern of reflecting coating applied can be of any shape or format, can be random in shape or format, or can be registered so that the prism facets are coated in a precision pattern. The coating is preferably a metallic reflective coating of material, such as, aluminum, silver, copper, etc.

The result is a retroreflecting material which creates a uniform light pattern (the result of the different size retroreflecting prism facets created) and a material that has a high degree of color (the result of the colored adhesive wetting the transparent uncoated facet surfaces of the prisms).

Alternatively, the adhesive backing can be spaced away from the patterned metallized prism facets to allow an air space so that the index of refraction change from prism material to air allows the uncoated portions of the prism facets to specularly reflect light.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partially diagrammatic illustration of an early step of a prior art embodiment of a process for forming a retroreflective material.

FIG. 2 is a similar illustration of a subsequent step in which a reflective metallic deposit has been formed on certain portion of the microprism formations formed in FIG. 1.

FIG. 3 is a similar illustration showing a colored adhesive coating material deposited over the entire back surface of the sheet material of FIG. 2 and a fabric layer adhered thereto.

FIG. 4 is a similar illustration showing the removal from FIG. 3 of the carrier sheeting.

FIG. 5 is a partially enlarged sectional view of an alternate multilayer embodiment of the invention.

FIG. 6 is an enlarged partial sectional view of an alternate embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

Turning first to FIG. 1, the first steps in the process of the invention is similar to that of the prior art depicted in the aforementioned U.S. Pat. No. 5,239,882. A thin flexible sheet material body member 10 is temporarily laminated to a relatively thick carrier sheet 12 by an adhesive layer 14 which preferentially adheres to the carrier sheet 12. In this step, the thick carrier sheet 12 has been precoated with the adhesive 14 and is passed through the nip of a pair of laminating rollers (not shown) with the body member 10.

In the next step (not shown), the lower or opposite surface of the body member 10 is provided with a thin tie coat 20 of synthetic resin. This coated laminate is then pressed against the surface of a mold 22 with closely spaced microprism recesses 24 formed therein in which is deposited a transparent fluid synthetic resin composition. The assembly is exposed to heat or ultraviolet rays from the lamps 28 to cure the fluid resin composition to form solid microprism formations 26 on the surface of body member 10.

In the illustrated embodiment of the process, the sheet material is stripped from the surface of the mold 22 and inverted, then vacuum metallized or otherwise treated to selectively form transparent reflective metallic deposits 30A–30B on the surface of the microprism formations 26 leaving some prisms 50 uncoated, as seen in FIG. 2.

In FIG. 3, a laminate is formed in which an optional flexible fabric 36 is bonded to the structure of FIG. 2 by a coating 38 of colored adhesive disposed over the entire surface of the microprism side facets. Thus, this coating 38 is in direct contact with those microprisms 26 which do not have the metallic deposit 30A–30B.

In FIG. 4, the carrier 12 and its adhesive bonding layer 14 have been stripped from the transparent body member 10 and sheet 12 supporting the microprism bodies 26.

The microprisms 26 are closely spaced and can be described as cube corner formations. Details concerning the structure and operation of such microprisms may be found in Rowland U.S. Pat. No. 3,684,348 granted Aug. 15, 1972. These microprisms or cube corner formations may have a side edge dimension of up to 0.025 inch, but the preferred structures use edge dimensions of not more than 0.007 inch, and most desirably on the order of 0.005 inch.

The body member of the sheeting will generally have a thickness on the order of 0.010 inch and preferably about 0.006 and 0.002 inch when a highly flexible laminate is to be formed, depending upon the method of fabrication, the resins, and other characteristics desired for the retroreflective sheeting.

The microprism sheeting may be formed by casting prisms upon a film surface functioning as the body, as described above, or by embossing a preformed sheeting, or by casting both body and prisms concurrently. Generally, the resins employed for the microprism sheeting are cross linked thermoplastic formulations, and desirably these resins provide flexibility, light stability, and good weathering characteristics. In some instances, the front face of the retroreflective sheeting may be provided with a protective coating such as by application of a lacquer or other coating material. Suitable resins for the retroreflective sheeting include vinyl chloride polymers, polyesters, polycarbonates, methyl methacrylate polymers, polyurethanes and acrylated urethanes.

To protect the relatively thin body member during processing, the relatively thick carrier temporarily bonded thereto will generally have a thickness of 0.005–0.008 inch. The adhesive used to effect the bonding therebetween preferentially adheres to the carrier and is conveniently a silicon adhesive applied to a thickness of about 0.00025–0.0005 inch. When ultraviolet curing of the resin in the prism is employed, the adhesive must be transparent to the light rays. Although various resins may be employed for the carrier, polyesters and particularly polyethylene terephthalate are desirably employed because of their toughness and relative resistance to processing conditions. As with the adhesive, the carrier should be transparent to the ultraviolet radiation used to effect curing. Moreover, the surface of the carrier may be treated to enhance the preferential adhesion of the adhesive to the surface of the carrier.

As is known, the reflective interface for the prisms may be provided by a reflective coating of metal or by an air interface. In the preferred embodiment of the present invention, a reflective coating is provided only upon selected portions of the surfaces of at least some of the microprisms, and such reflective coatings have most commonly been vacuum metallized aluminum deposits, although metallic lacquers and other specular coating materials may also be used. Alternatively, as shown in FIG. 6, the adhesive backing 36' can be spaced away from the patterned metallized prism facets to allow an air space 300 so that the index of refraction change from prism material to air allows the uncoated portions of certain of the prism facets, e.g., prism 50, to specularly reflect light.

In one embodiment, the vacuum metallized prism surface is printed in a coating apparatus with a grid-like pattern.

Pattern metallizing can be used to vacuum coat just the tip of the prism in a number of ways. One way is to create a very small metallized area, in the order of a 0.004" dot or triangles and register the metallizing so that it is on the tip of the prism. Also a random pattern of dots spaced apart by unequal distances can be created such that no mater how the pattern is located on the prism array some of the dots will be located on the tops of the prisms. Another method is to create a pattern that is a series of lines which vary in width, from 0.004" to 0.050" for example, so that some prisms are metallized with a narrow width area and others are metallize with a wider width area. The lines in the pattern would be present in multiple directions, for example three directions 60 degrees apart, and differentially spaced such that no matter how the pattern occurs on the prism array some small, some large and groups of large prisms will be created.

A preferred method of pattern metallizing the deposits 30A–30B of FIG. 2 is to pass the sheeting, upon which the exposed prism formations 26 have been formed, through rollers which cause a negative image in oil of the desired pattern. The sheeting then passes by a metallizing deposition apparatus. The oil pattern prevents local metal deposits, however metal is printed or deposited in regions not covered by oil. (See U.S. Pat. No. 5,412,187, Walters et al., issued 2 May 1995).

In either of the techniques, the result is that some of the microprism facets 40 are partially coated, others are completely coated with the reflective deposit 30A and 30B, respectively, and the remaining prism surfaces 50 are free from any reflective coating.

A colored non-reflective light dispersive adhesive coating 38 is then applied over the entire prism surface and directly coats the side facets of unmetallized prisms or prism portions. Thereafter, the backing fabric material 36 is applied.

In an alternate embodiment as shown in FIG. 6, a colored adhesive 38' is applied in a pattern to the prism surfaces and to a depth greater than the height of the prisms. When the backing fabric 36' is laminated thereto, it is spaced from the prisms by the adhesive 38' and this provides an air interface 300 about the uncoated prisms 50, so that light may be retroreflected therefrom.

The backing 36 may be a woven or laid fabric, or a flexible, durable polymeric material. Suitable resins include polyethylene, polypropylene, polyurethanes, acrylated polyurethanes and ethylene/vinyl acetate copolymers. Polyester and urethane fabrics may be employed as well as those of natural fibers such as cotton. Flame retardants may be incorporated in the adhesives as well as in the fabric backing 36 to impart flame retardance to the retroreflective material.

Although other metals may be used to provide a specular metal deposit including silver, rhodium, copper, tin, zinc, and palladium, the preferred and most economical processes utilize aluminum vacuum deposition. Other deposition techniques include electroless plating, electroplating, ion deposition and sputter coating.

The step of adhering the backing to the retroreflective sheeting may simply involve passing the adhesively coated retroreflective sheeting through the nip of a pair of rolls together with the backing material 26 to apply the necessary pressure to effect adhesion. If a heat activatable adhesive is employed, the retroreflective sheeting may be subjected to preheating prior to passage through the rolls, or the rolls may be heated to achieve the necessary activation. However, it is also practicable to employ ultrasonic welding and other techniques to bond the backing material to the retroreflective sheeting by the material of the backing material itself when it is thermoplastic.

To provide a coloration to the retroreflective light at night, a dye may be incorporated in the resin used to form the body member 10, or the tie coat 20, or even the prisms 26. As an alternative to a dye and as an effective necessity in some resin systems, the coloration may be provided as a finely divided pigment which is well dispersed; however, some loss in retroreflectivity will occur as the result of refraction by pigment particles which are directly in the path of light rays.

The different size retroreflective prism surfaces may be observed in FIG. 4 from a comparison of the metal backing 30A on the tips of the prism 26A versus the complete metallization 30B on prism 26B. The un-metallized area 50 between the metallized prism facet areas 30A or 30B which is backed by a colored adhesive 38 forms a diffuse reflecting

surface rather than the normal specular refectory surface formed when the prism facets are air backed or vacuum coated with reflective metal coating.

A retroreflective film which consists of one or multiple layers of retroreflective films which are pattern metallized and laminated together with transparent films or adhesives can be made. The laminated films can contain different sizes of prisms in each retroreflecting layer creating excellent short and long distance retroreflective performance. The clear film or adhesive used during the lamination process must have an index of refraction which is close to the index of refraction of the material used to form the prism.

An example of one such alternate embodiment is shown in FIG. 5 wherein numeral 120 indicates a transparent top, or outer, film 0.0001" to 0.020" in thickness. Numeral 140 denotes a first prism layer of retroreflecting prisms 142 of a size smaller than the prisms 182 in second prism layer 180. Numeral 150 is a layer of transparent adhesive which has an index of refraction equal (approximately) to the index of a refraction of the prisms 142 in layer 140. Numeral 160 is a layer of transparent film 0.0001" to 0.020" in thickness. A thick film is preferred for this layer. Second prism layer 180 is a layer of retroreflective prisms 182 of a size greater than the prisms 142 in layer 140. An aluminum or other reflective coating 190 is applied to some of the retroreflecting prisms 142 and 182, respectively, in layers 140 and 180 using the previously described pattern metallizing process.

The small reflective coated prisms 142 in layer 140 are approximately 0.001" to 0.005" in pitch and designed to provide wide observation angle performance. The large reflective coated prisms 182 in layer 180 are 0.004" to 0.008 in pitch and provide narrow observation angle performance.

Layer 200 is preferably formed of an opaque white adhesive which bonds prism layer 180 to substrate 210.

In zone Z1 the incoming light rays R will be retroreflected from the large metallized prism reflectors 212 of layer 140. In zone Z2 light rays R are reflected off small prism reflector 190.

In zone Z3 the light will pass through layer 140, because of the index matching adhesive 150 and transparent film layer 160, and retroreflect from the much larger metallized prism facets 214 in layer 180.

In zone Z4 the light will pass through both layers of prisms 140 and 180 and diffusely reflect from the white adhesive layer 200 contributing to the whiteness (Cap Y) of the retroreflecting structure.

The structures described above can be expanded to include more layers of partially metallized retroreflecting prisms. The prism can be of various sizes in each layer, the metallic coating used may be different in each layer, and the area of pattern metallizing in each layer can be varied to change the retroreflecting or whiteness (Cap Y) properties of the overall retroreflecting structures.

The above-described sheeting can be used to form structures, such as traffic control materials, vehicle markings, photoelectric sensors, internally illuminated articles, partially light transmissive signs, directional reflectors, garments and marking.

Equivalents

Having thus described a few particular embodiments of the invention, various alterations, modifications and improvements will readily occur to those skilled in the art. Such alterations, modifications and improvements as are made obvious by this disclosure are intended to be part of this description though not expressly stated herein, and are intended to be within the spirit and scope of the invention. Accordingly, the foregoing description is by way of example only, and not limiting. The invention is limited only as defined in the following claims and equivalents thereto.

We claim:

1. A method of forming retroreflective sheeting comprising the steps of:
   a) forming an array of microprisms in a sheet of material, the microprisms each having a base facet with side facets extending therefrom and meeting at an apex; and
   b) forming a reflective coating throughout an extended area of the array on (i) all the surface area of the side facets of a first set of the microprisms, and (ii) on a portion of the side facets of a second set of microprisms, thereby forming a relatively small retroreflective microprism surface area on the second set of microprisms, as compared to the larger retroreflective surface area of the first set of microprisms, wherein all the surface area of the side facets are reflectively coated, and leaving any remaining microprism facets with no reflective coating.

2. The method of claim 1 including the step of forming a colored non-reflective coating over some of the facets having no reflective coating.

3. The method of claim 1 including the step of forming an air space adjacent the facets having no reflective coating.

4. A sheeting made in accordance with the method of claim 1.

5. A method of forming retroreflective sheeting comprising the steps of:
   a) forming a first array of microprisms in a sheet of material, the microprisms each having a base facet with side facets extending therefrom and meeting at an apex;
   b) forming a reflective coating on (i) all surface areas of the side facets of some of the microprisms in the first array, and (ii) on a portion of the surface areas of the side facets of some of the microprisms in the first array and leaving the remaining surface areas of microprism facets in the first array with no reflective coating;
   c) forming a first transparent coating over the first array;
   d) forming a second array of microprisms in a sheet of material, the microprisms each having a base facet with side facets extending therefrom and meeting at an apex;
   e) forming a reflective coating on (i) all surface areas of the side facets of some of the microprisms in the second array, and (ii) on a portion of the surface areas of the side facets of some of the microprisms in the second array and leaving the remaining surface areas of microprism facets in the second array with no reflective coating; and
   f) bonding the first and second arrays together.

6. A sheeting made in accordance with the method of claim 5.

7. Retroreflective sheeting comprised of an array of microprisms formed on a sheet, each microprism comprising a solid body having a base side with facet sides extending to an apex, with a first set of said microprisms having the entire surface area of the side facets covered with light reflective material and a second set of said microprisms having the side facets only partially covered with reflective material, thereby forming a relatively small retroreflective microprism surface area on the second set of microprisms, as compared to the larger retroreflective surface area of the first set of microprisms wherein all the surface area of the side facets are reflectively coated.

8. The sheeting of claim 7 wherein some of the prism facets are left completely uncovered.

9. The sheeting of claim 8 wherein a colored backing is bonded to the uncovered facets.

10. The sheeting of claim 7 which comprises a structure selected from the group of structures including traffic control materials, vehicle markings, photoelectric sensors, internally illuminated articles, partially light transmissive signs, directional reflectors, garments and markings.

11. Retroreflective sheeting comprising:

a) a body member having a planar face and an array of closely spaced microprisms each having a base adjacent said planar face from which side facets extend which intercept at a tip;

b) a reflective interface extending throughout the entire array of said microprisms in a pattern over selected portions of the side facets of a first set of microprisms such that certain microprism side facets of said first set have a non-reflective interface while some microprisms of said first set have a reflective interface on all surface areas of the side facets, and microprisms of a second set have a reflective interface on only a portion of the surface area of the side facets, thereby forming a relatively small retroreflective microprism surface area on the second set of microprisms, as compared to the larger retroreflective surface area of the first set of microprisms wherein all the surface area of the side facets are reflectively coated; and

c) non-reflective covering over the side facet surfaces of some of said microprism facets having no reflective interface whereby lights rays impinging on said first planar face and thereafter impinging upon the base of microprisms having reflective interfaces are retroreflected thereby in the direction from which they came and those impinging upon the base of microprisms having a non-reflective covering are refracted therefrom.

12. The retroreflective sheeting in accordance with claim 11 wherein said reflective interface is comprised of a metallic layer and the non-reflective covering is a colored adhesive coating.

13. The retroreflective sheeting in accordance with claim 11 wherein a fabric is bonded to said coating.

14. The retroreflective sheeting in accordance with claim 11 wherein some of said microprisms having no reflective interface have an air interface formed about substantially the entire side facet surface.

15. The sheeting of claim 11 which comprises a structure selected from the group of structures including traffic control materials, vehicle markings, photoelectric sensors, internally illuminated articles, partially light transmissive signs, directional reflectors, garments and markings.

* * * * *

CERTIFICATE OF FILING AND SERVICE

I hereby certify that on this 27th day of June, 2011, two bound copies of the Brief of Appellant were served via U.S. Mail, postage prepaid, to the following:

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I further certify that on this 27th day of June, 2011, the required number of copies of the Brief of Appellant were hand filed at the Office of the Clerk, United States Court of Appeals for the Federal Circuit.

The necessary filing and service were performed in accordance with the instructions given me by counsel in this case.

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Dated: June 27, 2011

Sandra K. Nowak
Counsel for Appellant

DECLARATION OF AUTHORITY
PURSUANT TO FED. CIR. R. 47.3(d)

I, Danielle M. Staley, hereby declare under penalty of perjury that I am duly authorized to sign on behalf of Counsel for Appellant, Sandra K. Nowak, as she is unavailable to do so himself.

Executed: June 27, 2011

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